July/August 2005 >> Vol.21

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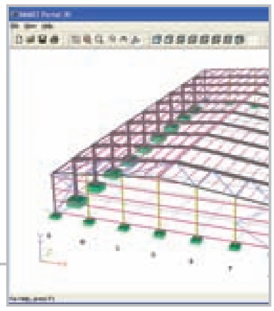
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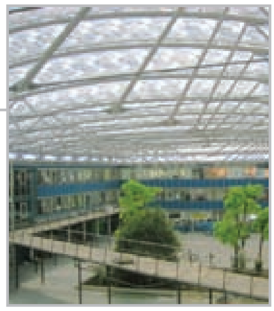
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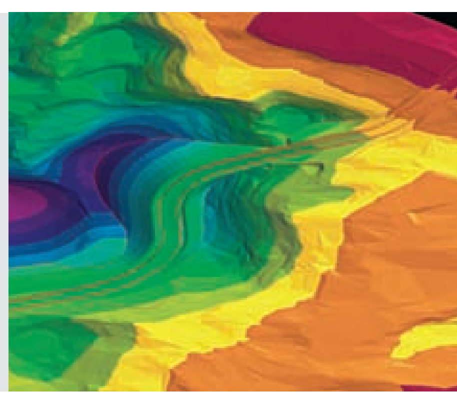














Study reveals challenges for UK architects

Facing much tougher competition, more demanding customers, and new legal requirements, UK architects and engineers are actively seeking to strike new paths in meeting upcoming challenges. This is one of the results of a major European industry study just completed by Maisberger Whiteoaks on behalf of Nemetschek.

The independent study identified that although the challenges mentioned above appear to be key factors for all countries polled, the frequent citation of the legal aspect throughout the UK is striking. Particularly, the Asbestos Directive and the EU Energy Certificate can be regarded as looming issues. "A comparison between the European results shows that architects and engineers are largely confronted with similar issues throughout the different countries. Today, software vendors must offer tools for change and cost management, design management, and collaboration in order to actively support their customers in meeting market expectations," states Harald Krohmer, Managing Director Nemetschek UK.

Focussing on software investments, the study shows that almost one third of the architects and engineers feel it is critical to upgrade CAD systems to solutions that enable an integrated end-to-end workflow. 21 percent are eager to invest in other software and education, whereas new CAD acquisition and the complete replacement of the existing system play a minor role (12 percent and three percent respectively).

The respondents identified three key features of a successful AEC Software: First and foremost easy handling and a balanced price / performance ratio contribute significantly to the buying decision. Low training costs and the manufacturers' reputation follow with some distance. To download the full report, entitled. Business Potentials for Architects and Engineers.go to ***www.nemetschek.co.uk.*** Meanwhile, for more on Nemetchek's reaction to this study, turn to page 11.

CADlogic unveils 'no cost' 2D CAD system

UK CAD software developer, CADlogic has just launched Draft IT, a free 2D PC CAD system, that's claimed to be fast and easy to use without training.

Draft IT is designed to assist the user at all stages of drawing creation with a variety of visual drawing aids. For example in most drawing or modifying functions it is possible to switch on dynamic dimensions displaying Cartesian (X, Y) or Polar co-ordinates, thus allowing the user to identify the next position without keyboard entry. Alternatively "snaps' can be used whereby the relevant symbol and description is displayed at the cursor when browsing over end points, mid points, intersections etc. Another of the Draft IT visual aids is the 'Entity Handle'. These handles are displayed when an entity is selected for modification. The user can simply click on a handle to select it and then either move the complete entity or redefine the handle position as required.

Draft IT has a number of settings the user can define for new drawings including support of Metric and Imperial units for co-ordinate input and dimensioning. Some of the other Draft IT features and functions are listed include Drawing (Line, Arc, Circle, Rectangle, Text), Dimensions (Linear, Radial, Angular, Leader Arrow, Double Arrow), and Modify (Copy, Mirror, Rotate, Rectangular Array, Polar Array, Scale, Stretch, Offset, Fillet, Chamfer, Trim/Extend)

CADlogic also offers an enhanced version, Draft IT PLUS, which features more functionality for £49. These include PDF created with pdfFactory trial version (***www.pdffactory.com***), Area Fill, Hatch Fill, Insert Image, User Symbols, Export (DWG or DXF), Ellipse, Drawing Templates, Multiple document interface, Line thickness, Layers, and Selection Filters. ***www.cadlogic.com***

ADT helps surveyor improve client service

Rosser Morris, a Bedfordshire-based team of surveyors, has recently invested in more seats of Autodesk Architectural Desktop (ADT). Rosser Morris designs and prepares plans and other details for local authority planning and building regulations, concentrating on the small to medium commercial and domestic markets. Company director Ben Morris explains that designing in 3D using ADT has improved their service to clients, while at the same time, helping local authorities understand the details of plans submitted which eases the process of getting them approved.

"ADT makes it simple to generate standard section details such as cavity walls, roofs or partitions, which look impressive and help clients understand what their finished structure will look like," says Morris. "Also, because ADT makes it easy to make changes to a design, we are able to modify drawings without having to make additional charges. These features all help us to keep our fees competitive and ensure the final design reflects the client's requirements.

"If needed we can send the planning department a 3D model so that they can have a closer look at the impact of an extension, for example. This means that we can supply them with all the data and detail they need without any hold-ups." ***www.autodesk.co.uk***

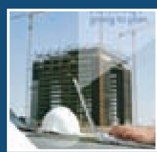
BBC's structural achievement



A new £72m flagship building at Pacific Quay, Glasgow will provide new headquarters for BBC Scotland. The structure has been fully modelled using CSC's 3D+ software, which has accelerated the design and detailing process of the complex structure.

Faber Maunsell provided the civil/structural services for the project. Resident Engineer, Emily Cruickshanks comments, "The building structure at the BBC Pacific Quay was very complex, with varying steel levels and a large number of technical requirements. The whole building was modeled using 3D+, which allowed us to use NavisWorks to "fly through" our model and help transfer design information to the sub-contractors. By using the 3D+ model with NavisWorks it also meant that site checking could be carried out much more quickly than from the two dimensional drawings, as members could be identified quickly. The model was also helpful in coordinating services within the structure" ***www.cscworld.com***

Project management debut



Concilio, a new web-based project extranet tool developed specifically for the construction industry, is claimed to provide significant time and cost savings based on results from applications in projects totalling some £500m. Its developer, secure internet and e-mail specialist, intY believes these proven benefits can be achieved on other projects, introducing considerable financial savings across the industry.

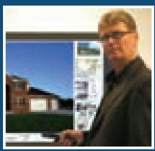
concilio is a secure project extranet that manages and catalogues all project information from complex illustrations and drawings to progress reports and financial details. ***www.intYconcilio.com***

Longhorn becomes Vista



Microsoft has announced that Windows Vista will be the official name of the next version of its flagship operating system, and that it will ship in 2006. Previously codenamed Longhorn, the long-awaited OS will be available in 32-bit and 64-bit versions. It will also feature a built in 3D graphics system, which could have a major impact on how CAD software is developed. A beta 1 version for developers and IT professionals is available now. ***www.microsoft.com***

VR for house builders



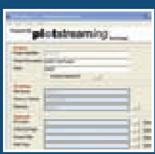
The EON Sales Assistant, a new software package from Cheshire-based Design Academy, is designed to enable prospective house buyers to take a virtual tour of their new property even before the first foundations have been laid. It then allows them to customise every aspect of the home from brickwork or flooring materials through to kitchen and bathroom fittings, and even provides them with a 'real-time' view of what they'll see out of each window. ***www.design-academy.co.uk***

Promap takes on NextMap



Intermap Technologies has signed a distribution agreement with Promap, part of the Landmark Information Group. The agreement will make Intermap's NEXTMap Britain elevation data available directly through the Promap Web 'pay as you go' mapping service. NEXTMap Britain provides accurate nationwide height and contour data, which maps the rise and fall of the land across the whole of England, Wales and Scotland. ***www.promap.co.uk***

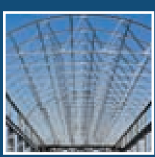
AutoCAD plot management



UK-based AutoCAD reseller C A Design Services (CADS) has been appointed as sole reseller for Plotstream in Europe by Triple R Technologies based in Texas.

Plotstream is a server-based software solution designed to streamline and meet companies AutoCAD plotting requirements. Unlike many batch plotting systems, Plotstream's processing is done away from the users' desktops. ***www.cadesignservices.co.uk***

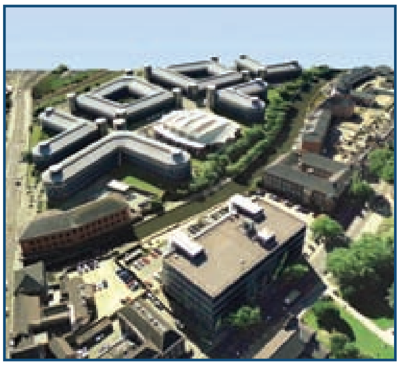
STEEL eases Eurocode pain



CSC is one of the partners in a pan-European project, STEEL. STEEL is primarily aimed at easing the painful introduction of Eurocodes for steel and composite design. Via the web, the STEEL project will deliver much needed design information and many design aids for use in the Eurocodes. A major part of this work includes typical Eurocode worked examples to assist structural engineers when working with EC3 and EC4 designs. ***www.cscworld.com***

More news stories, updated daily, at:
www.cadserver.co.uk

Realtime architectural cityscapes



Aerial photo-mapping company BlueSky has launched a new digital imaging service to create cityscapes using high resolution aerial photography and 3D models. With realistic 3D visualisations viewers can fly around towns and cities from the air or near the ground viewing streets and buildings from any direction and any angle. For architects making presentations of new developments, BlueSky can supply special 3D software for adding proposed development visualisations that can then be viewed on the Web.

BlueSky already supplies country-wide aerial photography and is currently re-photographing many towns and cities in super-high resolution using new digital camera technology. The cityscapes are computer-generated by matching images taken from different angles in a process called photogrammetry. BlueSky also uses building height and 3D landscape data from Intermap's NEXTMap Britain terrain map and other highly accurate height information captured by airborne laser scanning (LiDAR).

BlueSky is targeting this latest technology at professionals involved in town planning, architecture and building development, tourism and security. Work has already started in some cities with BlueSky associate ZMapping creating a detailed 3D Cityscape of London, whilst BlueSky is undertaking a project in Nottingham (pictured). ***www.bluesky-world.com***

Autodesk Civil 3D explained

Ground modelling and mapping specialist, Allied Terrain Technologies is running two, one day, hands-on Autodesk Civil 3D courses at the Tresham Institute, Wellingborough beginning 5th September.

Allied Terrain's Philip Madeley explains the benefits, "Many people express an interest in Civil 3D but they'd like an opportunity to see what it can do for themselves and up until now, some have been constrained by either time or cost. Attending a one day summer school is the ideal way for existing users to understand and experiment with Civil 3D or for potential clients to determine whether Civil 3D is an appropriate application for their business prior to full commitment.

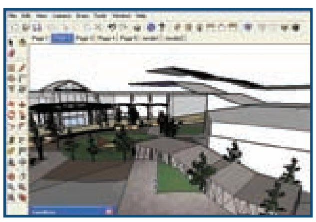
"Delegates will be given basic instruction and 'hands-on' training on ground modelling, grading, alignment design and piping." ***www.alliedterrain.co.uk***

TurboCAD Professional v11

Avanquest UK has launched the newest version of IMSI's flagship CAD product TurboCAD Professional v11. The latest version features a new set of design tools that includes the ACIS 14 Solid Modelling Engine, D-Cubed's Constraint Engine, Region Extrude, Gradient Fills, Transparency, and the LightWorks 7.4 Photorealistic rendering engine.

"TurboCAD Professional Version 11 combines the industry's best tools at an incredible price, a combination that is long overdue in the CAD industry," said Bob Mayer, EVP of Precision Design, IMSI. "We have continued to build on the success of TurboCAD, achieved by offering high-end professional-level design tools at a value price. In version 11 we have added the latest DWG support and the latest modelling, rendering and design technologies", added Mayer. "With over two dozen new features TurboCAD v11 continues to be a feature and price leader." ***www.turbocad.co.uk***

SketchUp develops terrain modelling tools



@Last Software has enhanced its 3D sketching/modelling package, SketchUp, with the release of Version 5 for both Macintosh and Windows platforms. SketchUp 5 brings a range of new features to designers, including a suite of new terrain tools called The Sandbox, which are designed to provide easy ways to model terrain and similar organic shapes, add roads, building pads, and car parks. The Sandbox allows the projection of 2D geometry onto complex 3D surfaces.

A vastly expanded components library (from 145 items to over 3,000) allows design objects such as windows, doors, automobiles and desks - and organic objects like people and animals - to lend greater variety and detail to designs. Enhanced sketching tools include depth-cued edges that make the foreground of a model darker than the lines in the background, giving it a more realistic feel. ***www.sketchup.com***



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invent

Autodesk: keeping it Real

Autodesk recently made its DWG libraries available in a new format for developers and customers, allowing the opening and saving of AutoCAD drawings without the presence of AutoCAD.

Martyn Day

Question: When is a DWG file not a DWG file?
ANSWER: When it has been created or edited in a non-Autodesk product.

That's the version that Autodesk, the creator of the global dominating AutoCAD drawing program, would like customers to think. The DWG file format is the most commonly used CAD file format on the planet, with customers creating and storing billions of designs in this proprietary, yet industry pervasive format. Through decades of market dominance in the 2D world Autodesk's AutoCAD and AutoCAD LT products have forced nearly all of Autodesk's competitors to offer some level of DWG compatibility within their products. And it's here, according to Autodesk, that the trouble starts, as they say poorly written third party DWG readers and writers are leading to file corruption within its customers.

However, DWG is a proprietary file format, owned, controlled and updated by Autodesk. The competitors have had to reverse engineer the format to include it in their products, to varying degrees of success. Autodesk's own DWG libraries have been for internal or 'close friend' use for some time but Autodesk is not likely to openly publish the structure of the DWG format anytime soon to help competitors. This new move, the release of RealDWG is an interesting decision to licence the libraries to customers and selected developers, at a cost.

I talked with Mark Strassman from Autodesk on the subject of RealDWG. Strassman explained, "For the past few years we have had a component called Object DBX which is the internal component of AutoCAD that reads and writes DWG files, but it's mainly an internal technology that's used in all of Autodesk-based products and we have literally only licensed it to one or two other companies.

"At the same time we are seeing more end-users owning third-party products which they use in conjunction with our products, and since we included error reporting in AutoCAD 2004, we can actually see when and why people are having problems with our products. It turns out that a pretty fair percentage of those errors that we get back are people getting back corrupt or ill-formed DWG files. And we are getting tens of thousands of these instances.

"Developers are asking for access to ObjectDBX and some customers are saying they are having problems with the DWG file. It seemed that making the ObjectDBX more accessible was a step we could take. So we have enhanced the API (Application Programming Interface), we have full.NET APIs, and we have lowered the price, to the same as some of the competitive products out there ($5,000 up front, and then $2,500 a year). We have also enhanced documentation, with work examples, to make it easier to integrate with their applications and renamed it 'RealDWG', because ObjectDBX doesn't mean anything to anyone. We have received hundreds of applications for this and developers are definitely excited and we have customers doing in-house development, for standards checking and data management. We have even had some competitors come and ask too, although in the contract it says it can't be used for competition but we are talking to them as well. We may be able to share formats with competitors, we can hopefully work something out."

The move is certainly a new venture for Autodesk, which has vehemently denied wanting to be in the 'component' business. But RealDWG sounds like a component technology that will be really useful to many developers and perhaps some of the higher-end AutoCAD users. The nod towards selected competitors is also of interest, although I suspect Autodesk would at least expect reciprocal access to their formats.

The move comes at a time when there is increasing competition for Autodesk's DWG data. Indeed, Strassman explained, "It seems that a lot of interoperability these days, from third party companies to our competitors, are going for interoperability using our format, using DWG. So given that's the case, we owe it to our customers to do what we can to make that more seamless."

Speaking of competitors, SolidWorks has released a free tool for AutoCAD users to translate backwards and forwards between old and new AutoCAD formats (DWG Gateway), as well as giving away a DWG editor with its SolidWorks 3D modelling product. SolidWorks' intention here is to try and stem the flow of AutoCAD revenue heading in Autodesk's direction. There's also a trend of Autodesk's own customers buying more 'cheap seats' in the form of AutoCAD LT, despite Autodesk's best efforts to hike up the price of that product. Perhaps it could be only a matter of time before 2D drafters look to even cheaper, perhaps non-Autodesk 2D tools?

These DWG initiatives wouldn't have been possible if it wasn't for the ready availability of reverse engineered DWG libraries from third party developers, mainly the Open Design Alliance. At this point, it's worth going over some potted history.

> At face value, RealDWG from Autodesk looks like a very late knee-jerk reaction to the OpenDWG concept. The very name implies that there is a non-real DWG

OpenDWG

2D CAD products have traditionally cost a considerable amount of money, I'd suggest that this is mainly due to AutoCAD's dominance in the market, which has helped set the price for professional-level CAD. For most customers, moving to another solution requires retraining, there's the legacy data issue and as the rest of the industry has standardised on AutoCAD, then it's a no-brainer, AutoCAD remains dominant.

However, back in the 90s, one US-based developer, Softdesk, which had created most of its vertical developments on AutoCAD had started a secret development program called 'Phoenix' to create a clone alternative. The project was to reverse engineer AutoCAD to produce a low-cost AutoCAD clone, covering interface, features, functions and to include support for the precious DWG format. Autodesk bought Softdesk mainly for its AEC products but somehow the Boomerang project managed to be spun out from Softdesk at the time of sale and ended up with Visio, creators of products like Visio Technical (now owned by Microsoft). Visio then put renewed efforts to the development and delivered 'IntelliCAD', the first AutoCAD clone that sold for around 10% of the price of AutoCAD. Fortunately for Autodesk, it had released a cut down version of AutoCAD some years previous, and Autodesk used AutoCAD LT to head off IntelliCAD 'at the pass'. However, at the time Autodesk also started a marketing campaign about '100% DWG', a negative-style' advert that reminded customers that only Autodesk's products were guaranteed to be 100% compatible, implying that IntelliCAD, as it was reverse engineered and not an Autodesk product, was going to corrupt or omit important data. Added to this it didn't help that IntelliCAD was rushed out, it was actually buggy and incomplete. It was a fairly bitter time between the two companies but ultimately IntelliCAD failed to make an impact.

Visio was eventually bought by Mic`rosoft but Microsoft had no intention of competing against Autodesk, and yet again the technology was bailed out of the mothership, this time to go it on its own as 'open source' software (like Linux).

Based on this technology, the non-profit OpenDWG Alliance (now called Open Design Alliance) was set up in1998 for CAD companies that needed to compete with Autodesk to pool their knowledge to improve the core reverse-engineered DWG libraries, together with the IntelliCAD Technology Consortium, where for a annual fee, application developers could take IntelliCAD (the AutoCAD clone based on the OpenDWG toolkit) and build DWG-based tools, without having to license any technology from Autodesk. Both organisations are still going strong, with the Open Design Alliance, now expanding to cover Bentley

Systems' officially sanctioned OpenDGN tool kit too. On that note, Bentley is a CAD competitor that has gone to extraordinary lengths to support DWG, with the V8 generation of MicroStation supporting DWG a as native format, should users wish to only work in DWG work mode.

Reaction to RealDWG

In response to Autodesk's move, Evan Yares, President of the Open Design Alliance explained, "We assume that the RealDWG announcement is targeted specifically at the Alliance, and is intended to win-over some of our members. To the extent that Autodesk is successful in doing this, it could have a negative effect on the Alliance's ability to serve its members. We are a non-profit consortium, and rely upon membership dues to fund the development of our libraries.

"Autodesk has cranked up its rhetoric machine, making vague allusions to broad problems with third-party DWG compatibility problems, and claiming great concern about this issue. If Autodesk wants to live up to its rhetoric, the solution is clear. All they need to do is publish the specification for the DWG file format."

Similarly, Arnold van der Weide, President of the IntelliCAD consortium (www.intellicad.org), was keen to point out the negatives of RealDWG. "At the IntelliCAD Technology Consortium we found that currently a majority of DWG files are not generated or edited by products from Autodesk anymore. This offers a challenge not only to the IntelliCAD Technology Consortium but in light of the recent announcement of RealDWG also to Autodesk. Unfortunately RealDWG isn't available for developers who Autodesk regard as their competitors. With this Autodesk has missed an opportunity to set the one and only single industry DWG standard. At the IntelliCAD Technology Consortium we believe it is time that we work on this single standard which will benefit the whole CAD industry. I therefore call on Autodesk to publish the DWG file format and work with industry to set up an independent DWG certification entity to ensure the quality and consistency of the DWG file format."

Conclusion

I'm not too sure about demands for Autodesk to openly publish the DWG file format from technology developers that exist to provide Autodesk's competitors access to the format. Although Bentley has shown some way forward in 'opening' DGN there is a catch here and to gain access to those libraries you have to join the Alliance, a pre-requisite of which is to tell everything you know about DWG to the Alliance – obviously excluding Autodesk's interest to join. However, there is nothing wrong with reverse engineering file formats and for customers this can be liberating when wanting to part company with a CAD vendor.

At face value, RealDWG from Autodesk looks like a very late knee-jerk reaction to the OpenDWG concept. The very name implies that there is a non-real DWG and the pricing is too close to the competition to be anything other than an attack on the many DWG reverse engineers. However, I also believe there could well be many cases when DWGs get passed around a number of Autodesk and non-Autodesk applications which may introduce some levels of corruption. Though here, data corruption is not unheard of within mixed Autodesk products alone.

It strikes me that Autodesk is indeed aware that DWG has become a major interoperability format, though mainly through reverse engineered toolkits and with RealDWG Autodesk may be able to wrestle back a certain amount of control, together with providing more predictable results for customers. The licensing appears to be vague enough to allow Autodesk a case by case decision on which competitors it will work with, although the few customers that want this functionality, together with the many registered Autodesk third party developers will welcome this move.

Autodesk is once again focusing on its formats with a new aggressive air to competition. There has been a big push of DWF against Adobe's PDF for the 'open' engineering publishing format and now with RealDWG Autodesk is looking to protect the company's considerable interests wherever the native file is read or written. Even if the DWG Alliance has good DWG readers, which it does, everyone would admit that having an equivalent tool from the original vendor would be preferable. Although, if you were competing against Autodesk, I don't know many that would be too relaxed about relying on Autodesk as a component supplier.

The move certainly has caused a strong reaction from the DWG reverse engineering fraternity which sees RealDWG as a threat, Should members/customers sign up with Autodesk, then there's less money to reverse engineer the DWG format, which everyone admits is an increasingly complex task. With this release, the cat is most certainly amongst the pigeons.

www.autodesk.com/autodeskrealdwg
www.opendesign.com

Real time costings

A recent survey shows that UK engineers and architects are lagging behind their European peers when it comes to practising lean construction management. Nemetschek is trying to change this by working with CSSP, a developer of cost management software.

Greg Corke



Nemetschek, the developer of Allplan and VectorWorks, recently commissioned a European wide study looking at New Business Potentials for Architects and Engineers. According to the report, economic factors such as cost planning and TAI (Tendering, Awarding Contracts and Invoicing) still play a somewhat minor role in the United Kingdom. By way of comparison, European architects and engineers rate these areas much more highly and would prefer software that is equipped accordingly. The study shows, however, that an ideally configured AEC solution needs to contain more than CAD if it is to satisfy the increased demands of architects and engineers. AEC Magazine talked to Harald Krohmer, Managing Director of Nemetschek UK about how the company is looking to address some of these issues.

Q One of the main findings highlighted in your report shows that UK architects and engineers are not paying as much attention to 'cost reduction', and 'Lean Construction Management' as the rest of Europe. How is Nemetschek looking to address this?

Harald Krohmer: In short, we intend to extend the functionality and features of Allplan in relation to the building construction information services and use the unique selling point of 3D to carry out volume calculations in combination with cost estimation, project management and finally tendering.

If you talk to anyone involved in the construction process - including the customer, architect, surveyor - you'll find that they are convinced that you need to have an informal database, a way to communicate or transfer all this information, and to be able to manage project changes more effectively. At the end of the day we talk about costs, we talk about the fact that a building is planned for a certain budget and commonly during the lifecycle of the project you run out of budget. People notice this, but their awareness of the financial implications is not precise. What we want to do is help those involved in the construction process get a closer view of the change management requirements.

To help introduce lean construction processes, such as 'just in time', 'collaboration management', and 'platform communication', we intend to collaborate with companies covering cost estimation, tendering, and project planning, and then users can benefit fully from 3D. The third dimension calculates the volume, and the fourth dimension calculates the volume along with all the costs. We want to enable our users to have more control over 'change management' so they are the owners of the costs at all stages of the project.

Q Some of your customers are already doing this in mainland Europe, in countries like Germany, but how will this be implemented in the UK?

HK: We are looking to collaborate with CSSP, a UK company who is focussed on project management and cost management of building and construction projects. We are working together to find a standard way of importing design catalogues and element catalogues from our side (the design side) into the cost calculation side. Of course there are several branches of construction - you have the engineering parts, you have house-building parts, you have infrastructure etc - they all use different elements and catalogues. We recognise that we currently have more or less seven applications in the market and we intend to offer seven different catalogues of elements to be the basis for the customisation of this type of collaboration.

For instance, you have the pre-cast market, engineering for street works, and residential buildings for wooden framework or timber houses. All the time you have the same application (Allplan) but it's customised differently.

Q So what's the technology behind this? How are these design catalogues stored?

HK: They are stored in the Allplan format – we import this. We have another product, a catalogue import product and database, called Alltop, which can be used to read different files - we can read XML files, and we can read ACSII files to import them as standard catalogues. Then after doing the design, based on those catalogues, they can be communicated to the cost calculation and tendering part of the software.

Q And this is where CSSP comes into play?

HK: Yes. The catalogues are more or less designed - they have to be customised in relation to the customers' application and main building and construction proposals. We have to have a basic load in our system based on applications, markets, and expectations, and then do the final customisation together with the customer - in the case of the construction firms, in relation to their specific projects.

For instance we have customers over here in Germany that are offering a unique service to engineering companies whereby they can calculate projects of up to 50 million Euros within a week, in 3D, with the output being a very precise volume calculation. Then Allplan's role ends and the next partner comes on board, which in the case of the UK is CSSP. We transfer the volumes from Allplan to CSSP's products and they do the real cost estimation, and once they have identified the suppliers they do the real tendering, in a very precise way.

> We want to enable our users to have more control over 'change management' so they are the owners of the costs at all stages of the project.

Q But hasn't this type of implementation for design catalogues been done before?

HK: To date, all the systems in the market have shipped as 'naked' systems, and the differences in the future will be to develop customised systems and catalogues in relation to the main applications of these construction companies. As an added value or unique selling point to their customers, they are able to reduce the cost calculation differences from +- 15% at the beginning of a project to +-5%.

If you think about big industry companies, who are building several supermarkets in the same way around the country, if you can offer them a way of designing, planning, and cost calculating precisely and from the beginning - it's a real plus for them in terms of time and money.

New Business Potentials for Architects and Engineers is available from ***www.nemetschek.co.uk***
More info on CSSP can be found at ***www.cssp.co.uk***

StruCad Version 11

For Version 11 StruCad has been brought bang up to date with a brand new Windows-style Graphics User Interface. But there's much more to the latest release of the steel fabrication software than a simple face-lift says Greg Corke.

Greg Corke

Product: StruCad Version 11 **Supplier:** AceCad **Price:** on application

StruCad is one of the most respected Structural Steel detailing packages on the market today. It provides an extensive array of parametric modelling tools, enabling users to model entire steelwork structures in 3D - down to the last notch, plate and bolt - then automatically generate drawings, material lists, and CAM data. This level of functionality is something you don't obtain overnight and it's taken its developer, AceCad, many years to achieve. However, while the program's capabilities have evolved considerably, development on the GUI (Graphic User Interface) has remained static for some years, making the product look a little dated.

The good news is that for Version 11, which has just started shipping this month, AceCad has given the GUI a complete overhaul, giving StruCad the look and feel of a modern Windows application, complete with enhanced usability. StruCad V11 includes standard Windows toolbars, complete with tooltips. These can be docked, icons can be displayed in two sizes, and new toolbars can be created or edited to suit an individual. Once set up, 'users can transfer their customised interface to other machines simply by copying a couple of files.

The enhancements to the GUI also extend to other areas, including dialogues, pop up menus, and the new Dynamic Ports Splitter. Here, StruCad's four port views, which typically contain views in plan, elevation and 3D, can be resized simply by dragging and dropping at the intersection of all four viewports.

StruCad's new look and feel is sure to make it a much more welcoming environment for first time users. However, AceCad still has a huge installed base to keep happy and not all users welcome change with open arms. As a result, StruCad V11 still supports the old style interface, though AceCad believes that it won't take long to win over veterans, once they give it a go. But beyond cosmetics and user interaction, where else has StruCad been enhanced?

Model limits: One of the major new enhancements is the increase in the number of members that are supported. Previously limited to 10,000, those working on huge projects would often have to split their models up into bite-sized chunks. Now due to a major re-write in Version 11, modelling limits have been virtually removed across the board. In addition, many of the key limits are now dynamic, only using the memory necessary for the number of items currently in the model, thus reducing the memory footprint of the model.

Xref: StruCad now has the ability to reference external drawings into a session. Xrefs can be inserted in both 2D and 3D, in SPF or DXF formats. This is particularly useful for bringing in architectural models, non-standard steel, or when working on structures made from a combination of materials.

Detail Views: Drawings generated by the detail command can now contain embedded data, which can be displayed on screen. Once a detail has been created, users can now label the drawing with the required part information such as stock size, mark, grade etc.

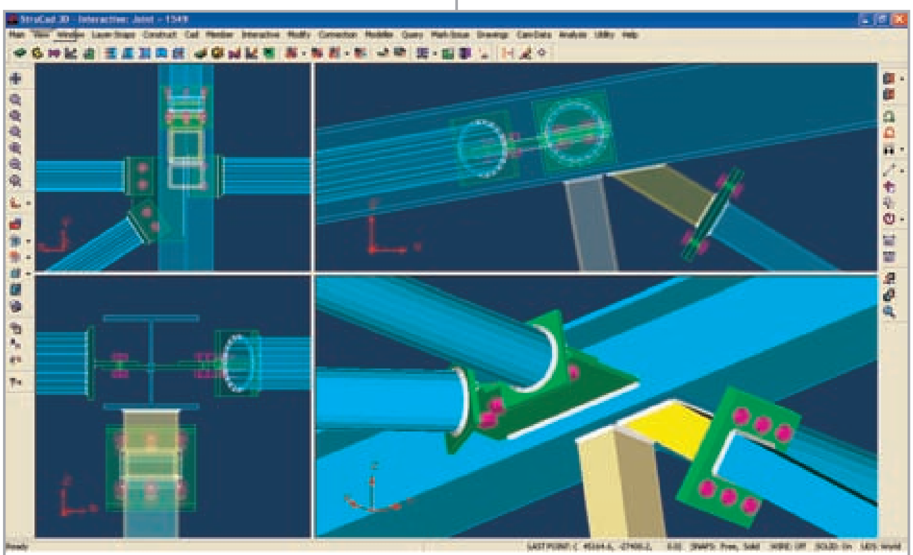
Nested Drawings: A new nesting system will allow the nesting of multiple drawings onto single sheets. While this will be of less interest to UK users, who typically deliver drawings on individual A4 sheets, the ability to place multiple drawings is sure to appeal to steel fabricators overseas.

Import/Export: StruCad has seen a wide range of enhancements to the import/export functionality available in StruCad's Analysis and Design option or StruCad Analyser. V11 now supports the new CIS2 (CIMsteel Integration Standards) analysis neutral file, which is designed to lay down standards for electronic data exchange between different steelwork projects and software packages. Also new for this release is a direct link to STAAD, which enables users to import/export files to and from the popular analysis package.

Cold rolled Systems: AceCAD has been working closely with Kingspan to improve its cold rolled macros. In addition to a new side rail support system, dialogue boxes have been made much clearer across the board.

Estimating: For the past few years AceCad has been concentrating on providing tighter links to its StruM.I.S fabrication management system. Building on this, Version 11 sees the introduction of a dedicated estimating module, a wizard style utility built into StruCad that can be used to calculate the cost of a model. In addition to calculating the price of steelwork, the estimating module can be used to determine fabrication, painting, transport, and erection costs.

Despite all these enhancements, AceCad still has a little way to go before completing all of its ambitions for StruCad V11. In our December 2004 preview of Version 11, Acecad had scheduled in StruConnect, an integrated or standalone moment connection design program for structural engineers. This should be ready later this year, alongside multi-user capabilities, enabling the automated synchronisation of the work of multiple users.



Conclusion

For StruCad Version 11, it's clear that AceCad has paid a great deal of attention to usability. The updates to the GUI are long overdue and help bring the product in line with StruCad's more 'Windows centric' peers. Other significant updates, like the lifting of restrictions on the number of members, give StruCad users the power to work more effectively with increasingly complex structures, while the enhancements to detail views and nested drawings help improve 2D drawing production.

However, despite this attention to 'usability', a better indication of where AceCad is looking to take StruCad, and steel fabrication software in general, comes with the integration of the estimating module from its StruM.I.S fabrication management system. By providing the tools to produce a full cost estimate of a job, AceCad is looking to introduce more users to features that are available in StruM.I.S, such as project timings, budgets and planning. The end goal is to homogenize the software and provide an integrated software suite, which can deliver real time feedback on steelwork. For example, should an architect decide to change the spacing between columns part way through a project the steel fabricator will be able to right click on a steel section in the model and get instant feedback on where it is in the plant, whether it's been sprayed, whether notches have been cut, or even whether it's gone off to site. It's all about all about giving the fabricator widespread access to data in respect of the model he's already created, which is where considerable productivity savings will be found in the future. ***www.acecad.co.uk***

Smart Portal

Through a simple-to-use wizard style interface, CADS is looking to offer steel fabricators a way to design and cost their own Portal Frame structures, ready for tender in a matter of minutes, says Greg Corke.

Greg Corke

Product: Smart Portal 3D **Supplier:** CADS **Price:** £2,500

Portal frame building construction is big business in the UK, forming the backbone for countless supermarkets, retail parks, and warehouses nationwide. But for many steel fabricators calculating an accurate estimate of a job for tender can be a task fraught with problems. An accurate quote requires an accurate design, one that is not only extremely cost effective, but also structurally sound. The problem is that in such a competitive marketplace tendering must be done with minimal overheads. Hiring a consulting engineer is one option, as is employing an engineer in-house, but with a new Portal Frame Design package, structural software specialist CADS is looking to provide steel fabricators with a way of designing and costing their own Portal Frame structures for tender, in as little time as possible.

Smart thinking

Smart Portal is a 2D/3D elastic/plastic portal frame design suite. It enables steel fabricators and structural engineers to rustle up a simple 3D Portal Frame Building Design in a matter of minutes via a wizard-style interface. Then, applying a combination of loads for analysis, design estimates can be created quickly. These can then be refined to optimise the design, and an accurate estimate sent off to tender. So there's the whistle stop tour, how does it work in practice?

3D geometry and loads: Creating a portal frame building in Smart Portal is simply a case of stepping through a wizard, rather than modelling individual structural elements. Starting with a template for a particular type of frame and roof shape, users define variables such as number of spans, length of span, number of frames, length of building, roof angle, support type etc, and a 3D model is developed on the fly.

The next step is to add all loads including dead, imposed, wind and snow. For example, dead loads can be selected from a library, which includes roof cladding, suspended ceilings, and services. Smart Portal includes a range of standard material types, though users can add their own manufacturer-specific values to the library or on the fly if required.

Smart Portal Advanced mode

While Smart Portal's Wizard style interface is ideal for steel fabricators looking to get an accurate quote in a matter of minutes, there's lot more depth to the product. Smart Portal's advanced mode enables structural engineers to carry out more complex aspects of portal framed building design.

For example, users can use the 'wizard' for the bulk of the design, and then swap out to advanced mode to gain more control over the design process or to carry out more specialist design operations. Users may want to design frames with non-uniform spacing, or features such as door frames (where users can design vertical posts and header beams), canopies, cantilevers and parapet posts. Users can also gain more control over loading conditions, to simulate specialist design scenarios, like fire collapse for example.

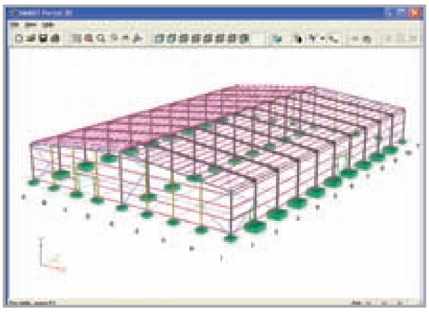
Design and analysis: Once all the geometry and loads have been defined, users simply click the Smart Autodesign button, and the software goes off and estimates member sizes for columns, rafters, posts, cross bracing, rails etc based on BS 5950 (N.B. CADS is already working to integrate European EC codes). The system then carries out elastic/plastic analyses of all ultimate and serviceability load combinations to ensure that BS code and user design criteria are satisfied economically and automatically re-selects sections where necessary to achieve this.

The whole process only takes a matter of minutes on a moderately specified PC, so users can quickly assess different design scenarios to see which is the most cost effective. Cost is currently defined only in terms of steel weight, but CADS is looking into ways of implementing actual material prices, where users can define costs for more accurate BOMs.

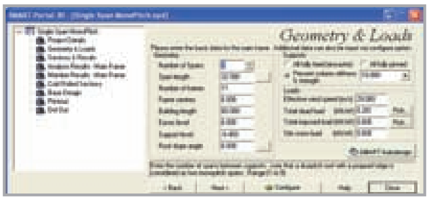
Output: Smart Portal provides a fully customisable report facility, where users can print out exactly what they require including sketch layouts, supports, loadings, primary and secondary member details etc. In addition, users can output reports to Microsoft Word or PDF format, and Smart Portal is also capable of creating DXF files for use in all the major CAD packages.

Smart Portal Jobs can also be loaded into CADS' AutoCAD-based steel fabrication solution, AdvanceSteel, for the automatic production of general arrangement drawings and fabrication details. Not forgetting the competition, CADS is also looking to introduce links to AceCad's StruCad and Tekla's Xsteel.

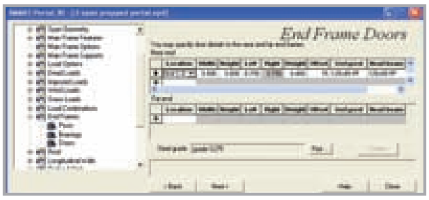
The past few years have seen Poole-based CADS take a fresh look at the steel fabrication sector - first with Advance Steel (formerly HyperSteel) and now with its in-house developed Smart Portal software. While Smart Portal has



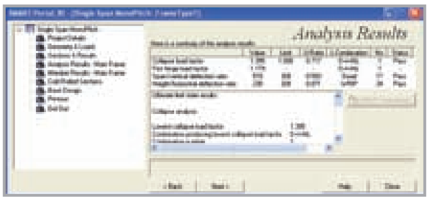
Smart Portal provides a number of frame and roof shape templates to start off the design process, and these can be edited on the fly.



Smart Portal's Wizard style interface enables users to quickly create a simple portal frame design complete with geometry and loads.



An advanced mode enables users to carry out the more complex aspects of portal framed building design, such as end frame door openings.



The system can carry out elastic/plastic analyses of all ultimate and serviceability load combinations.

the required depth of functionality to offer structural engineers a comprehensive Portal Frame design solution, it's in the steel fabrication sector that its use becomes more interesting.

Here, through its Wizard-style interface, steel fabricators are able to quickly generate accurate estimates for Portal Frame projects - not only for calculating the weight of steel required, but also ensuring the project will be structurally correct. After all, there's no point in being able to pull off accurate material lists for tender if the structure wouldn't stand up when built, or be able to withstand six foot of snow when it's located in Dubai.

With estimates in Smart Portal currently based on steel weight alone, it's good to hear that CADS is working on ways of implementing actual material costs. Furthermore, with links to steel fabrication software applications such as Advance Steel, Smart Portal also has the potential to become a front end Portal Frame design solution for steel fabricators. ***www.cads.co.uk***



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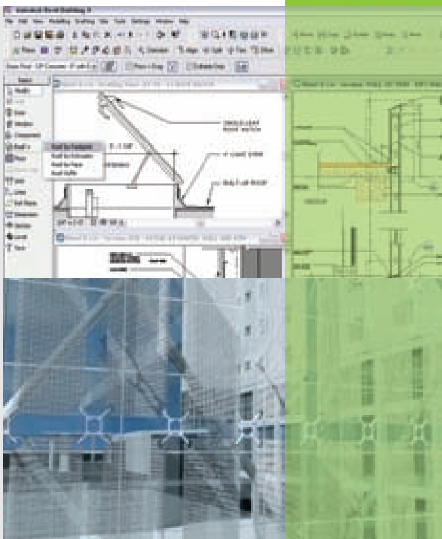
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Raising the roof

A London school was recently transformed, with the central courtyard redeveloped and covered it so it could be used throughout the year. The ambitious design required the expertise of structural design consultants, Michael Hadi Associates, using Robot Millennium structural analysis software.

Exciting architecture and a positive environment are well understood to improve performance in the workplace. Yet within the education system, many schools find themselves stuck with the legacy of less sympathetic and inspiring architecture, without the resources to make significant changes to the structure and design of their surroundings. However, one struggling school in South London secured Government funding to help transform its uninviting structure, identified as a key factor in explaining its poor results.

The school now boasts an extraordinary covered quadrangle, flooding the reclaimed space with light and creating a more open and inviting space for pupils and staff alike. The ambitious design of the quadrangle required the expertise of structural design consultants, Michael Hadi Associates, using Robot Millennium structural analysis software from ISS.

Secondary failure

In 1998 Kingsdale School in Dulwich, London, found itself struggling with poor results, and behavioural issues among its pupils. The built environment of the school was not aiding the situation. The school was built in a rectangular formation in plan, with a largely unused, open section in the middle. Pupils had to walk round the quad along narrow, dark corridors to get to their classrooms. The cramped, busy corridors were difficult for staff to monitor and time-consuming for pupils to navigate between lessons.

An extensive research programme was initiated, which included interviewing pupils, to devise the best solution to improving the school. The chosen design involved redeveloping the central courtyard and covering it so it could be used throughout the year. Walkways would be created through the courtyard for easy access across the school, with the rest of the space remaining open for flexible use such as group work or mealtimes.

Roof of concept

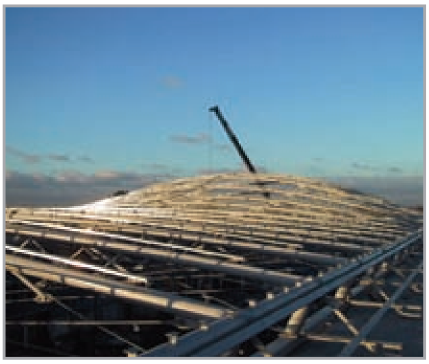
The design of the roof was clearly significant in realising the regeneration of the School. Structural design consultants, Michael Hadi Associates, were brought on board as structural consultants for this vital part of the school's transformation process. John Roycroft is an associate at Michael Hadi Associates, "Our challenge was to find a roof design that would satisfy several requirements," he explains.

>> Walkways were created through the courtyard for easy access across the school, with the rest of the space remaining open for flexible use such as group work or mealtimes.

"Firstly, we had to ensure that the weight of our proposed roof was as low as possible to enable a lightweight structure to span the full 40m courtyard width without intermediate supports. We were also knew that the existing building that the roof would sit on had very little spare capacity to resist extra lateral loads from wind. In addition, since this was a Government-funded project, we needed to keep costs as manageable as possible, yet still respect the aesthetic integrity required by the architect."

Michael Hadi explored several possibilities, including a folded plate ply roof, but the final design was a tied arch structure using transparent ETFE cladding. The ETFE panels contain three skins, controlled by sensors. Both the top and middle layers are patterned. To reduce light transmission in the summer the middle layer moves closer to the top layer, this intensifies the pattern and reduces light penetration. De-humidified air is pumped into the cushions to control them. "The big advantage of ETFE is that it is really light," says Roycroft. "The quadrangle is 40m by 80m, which is quite a big space, but the roof design only weighed in at approximately 40kg per square metre. It's only the steel arches that have any significant weight. Lateral loads were minimized by tying the aches at their feet and through detailed analysis of wind pressures through wind tunnel testing."

>> The roof's ETFE cladding panels contain three skins, controlled by sensors. To reduce light transmission in the summer the middle layer moves closer to the top layer.



Underneath the arches

The chosen design of the roof created a significant structural engineering challenge for Roycroft and his team. The roof comprises 22 arches of 11 different shapes and sizes, which needed to be pre-stressed on site to compensate for wind uplift pressures they could encounter once in position. "We had to define what the curvature of each arch would need to be prior to installation for the steel fabricator, and then what the final position of each arch would be once attached to the school roof," explains Roycroft. To complicate matters further, the slenderness of the arches was outside the limits set by the now superceeded code BS5950 Part 1:1990, in order to meet the need for weight reduction and aesthetic appeal. The slenderness of the

>>







structure, plus the presence of cables dictated that a full detailed geometrical nonlinear analysis be carried out.

At Michael Hadi Associates, the structural engineers prefer to use analysis and simulation software to confirm their hand calculations, rather than immediately turning to their computers for a quick answer. "Using computerised analysis cuts out people's intuition," explains Roycroft. "If you've done preliminary calculations yourself beforehand, when you run the problem through a computer you have a much greater understanding of the process – and a better idea of whether the result that the computer comes up with is accurate."

But on this occasion, Roycroft knew he needed some specialist assistance to ensure the arches were pre-stressed in the right way and to the correct geometry. "We had to be confident that second order effects were being modelled accurately, particularly as we were using a compression member that was very slender," he explains. "We hadn't got a program here that modelled cables in a non-linear fashion – crucial for the accurate positioning and tension of the arches. We tried several structural analysis packages, but we quickly determined that Robot Millennium was the best tool for the job."

Structural support

Robot Millennium from ISS is a complete structural analysis solution, with a particular strength in cable analysis, but also featuring frames analysis, FEM plates, shells and solid elements, together with code checks, dynamic analysis, both geometric and non-linear analysis and many other advanced features. The very straightforward GUI allows the user to model complex structures quickly and accurately and, crucially for Michael Hadi Associates, Robot is a 'true' non-linear solution with many different non-linear solvers and parameters available, ensuring model convergence of even the most challenging of structures. Using Robot, Roycroft could confidently model the true behaviour of the structure and not only the applied prestress but also the insitu cable prestress under all loading conditions.

"Robot is very user-friendly and as it's Windows based the interface is intuitive and quick to learn," says Roycroft. "In addition, if you do come up against difficulties, the Robot support team is excellent. You can email them an analysis problem and they are quick to help and sort it out. It's also important that they understand the engineering challenges we face, not just the software issues. We can explain situations from a technical point of view and they have a good understanding of how best to find the right solution."

Full marks

The pre-stressing of the arches needed to be absolutely accurate to ensure the sliding bearings on one side of the arches were specified correctly in terms of range of movements expected from temperature, gravity loading and wind.

"We also had to be confident that enough prestress was present to make sure the arch was always in compression under design wind uplift pressures. Having spent a lot of time looking at the problem both qualitatively and numerically ourselves beforehand, we were confident that even though our solution went beyond normal slenderness limits it would still work. Even so, the positive and accurate results we got from Robot gave us the confirmation and confidence we needed," says Roycroft. The solution has also saved the team a considerable amount of time. Roycroft estimates that to manually calculate the pre-stress requirements of the 11 different types of arch would have taken weeks. "It was a weekend's work using Robot Millennium," he says.



<< The weight of the roof had to be as low as possible to enable a lightweight structure to span the full 40m courtyard width without intermediate supports.

On the day of installation, each arch arrived on site in three pieces before being bolted together. Special lifting and pre-stressing cradles had been designed by Michael Hadi Associates for the specialist steel contractor SHStructures to lift each section into position. When the roof was finally ready to install, Roycroft and his team checked the pre-stress levels on site and discovered that Robot's results had indeed been very accurate. "It's fair to say this was a very successful project," says Roycroft. "From our point of view this was a real team effort, and the people at ISS and also the ROBOT Millennium software were a part of that team."

End of term report

The resulting roof has transformed Kingsdale School. The new roof has opened up the space and narrow corridors are a thing of the past. In designing the roof, Michael Hadi Associates were prepared to go beyond pre-defined limits to create the best possible solution for the architects, and ultimately for the benefit of pupils at the school. "This was a project that we all enjoyed working on, since the results could have such a positive effect on the school," concludes Roycroft. "We knew this roof and space could be very special from the beginning, we were entrusted by all involved to make it a reality; Robot Millennium was pivotal in getting us to that end point."

The culture and academic fortunes of Kingsdale School have transformed alongside its architecture. Grades have risen significantly, and the school is now a specialist college for the performing arts as well as a multimedia environment for academic, creative and vocational studies. Attitudes towards the school have completely changed, and these days staff and pupils alike are eager to welcome visitors to what they call "the DFES's greatest educational project – Kingsdale School".

www.issrobot.com

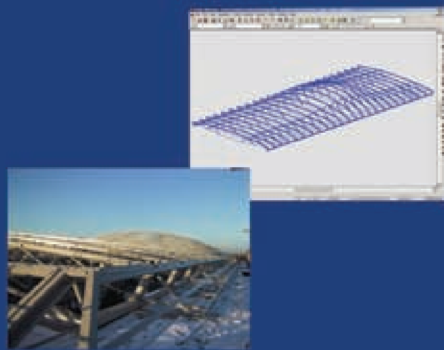
Structural Analysis, Design and CAD Solutions for the Design Consultancy



Millau Viaduct, France

Robot Millennium

Robot remains as the most commonly used FE software throughout Europe for Structural Analysis and Design.
Robot Millennium is routinely used for the analysis and design of simple/complex structures and makes detailed FE analysis a practical proposition for the Structural Engineer. The software includes plate, shell, plane stress, plane strain, axisymmetric and solid elements. Elements may be mixed as appropriate with beams, columns and other structural members such as cables. In this fashion it is possible to model a complete structure to investigate stability and load take down etc. Powerful 'state of the art' mesh generators with hole recognition algorithms provide unparalleled power and ease of use.
Robot Millennium leads the way in the analysis and design of flat slab structures. Using a FEM approach for analysis of the structure means that virtually any shape of slab or loading regime may be considered. The software designs for Wood/Armer moments, for moments with axial force, or just axial forces. Areas of reinforcement are generated to satisfy both ULS and SLS requirements (including cracking and cracked deflections)
Robot also includes more advanced features such as Cables with true catenary effects, dynamic analysis (time history, modal, seismic, response spectra), Nonlinear Analysis (both geometric and material).

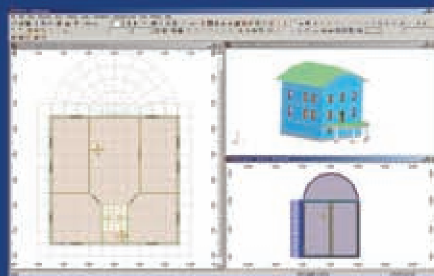


Lightweight Slender Roof, Kingsdale School, Dulwich.
Michael Hadi and Associates

CBS Pro

The ultimate modelling system for concrete and high rise buildings

CBS Pro is an object oriented software for modelling of Concrete Buildings. Work from 2D Projections to construct 3D models. Storey heights are defined so insertion of columns is a "one click" operation - create a node with a column attached. Perform calculations for each individual storey using column load take down (automatically derived) or for the whole building either using the internal solver within CBS or exporting to Robot Millennium in order to take through to the design stage. CBS Pro also supports IFC file format which means it can talk to most of the industry standard architectural CAD packages.



Building Modelled using CBS Pro

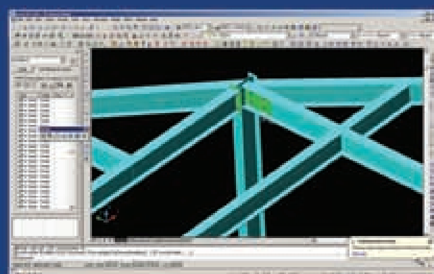
RCAD Steel & Concrete

Rcad Steel and concrete are AutoCAD based modelling and detailing systems for enhancing the workflow of the office environment.

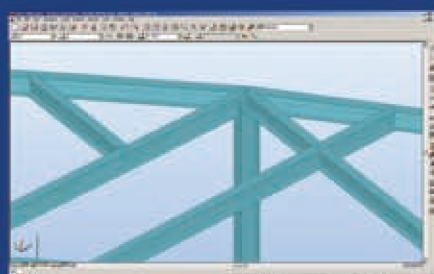
RCAD Steel will allow the engineer to develop models in AutoCAD with steel sections from a range of country databases, analyse and design that model with Robot Millennium and then create/update GA drawings or fabrications drawings automatically from the central model.

RCAD Concrete is a concrete detailing package within AutoCAD that will accept the design information from Robot Millennium RC Design module, for beams, columns or slabs. It will also operate as a standalone detailing environment benefitting from a wide range of macros for detailing standard shapes.

RCAD Steel or Concrete is available to run on the latest AutoCAD platforms including AutoCAD LT (requires RCAD Extender).



Steel Connection detailed with RCAD Steel



Full Steel Model Passed from RCAD Steel to Robot Millennium for Analysis and Design

Contact us for more details on:-

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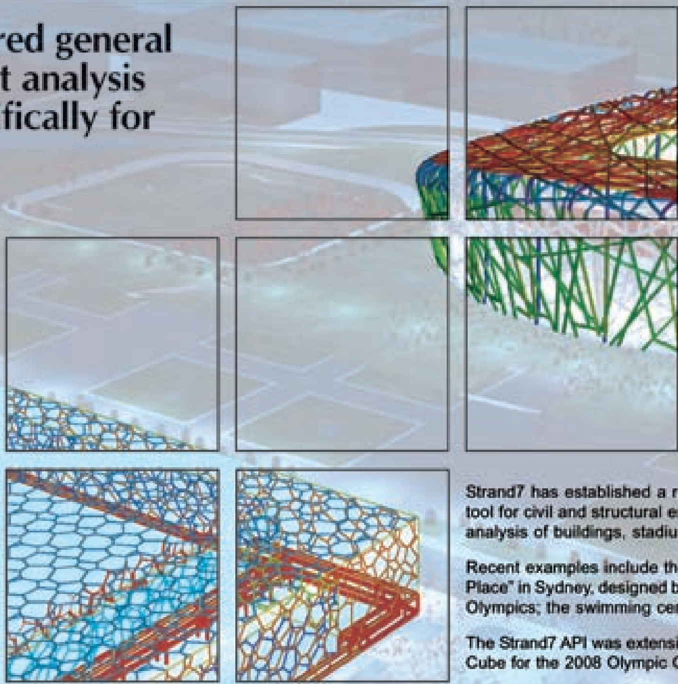
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The Strand7 API was extensively used in the analysis and optimisation of the Water Cube for the 2008 Olympic Games.

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Beijing's Waterworld

Strand7 has supported Arup Australia in the design of the 'Water Cube', the Beijing Olympics National Swimming Centre. The revolutionary structure plays on the geometry of water bubbles, and will be the largest swimming complex ever built.

The 2008 Beijing Olympics will have the largest and most unusual swimming centre ever built. The structure was inspired by the shape of an array of soap bubbles and is highly repetitive and constructible whilst appearing very random and organic. The Water Cube houses the pools for the Olympic swimming and diving competitions, along with seating and facilities for 17,000 spectators.

As part of the design process, a comprehensive 3D structural model was created and imported directly into Strand7, the Finite Element Analysis (FEA) software system. The Strand7 model comprised 24,000 beam elements with 12,000 nodes. There were 750,000 beam loads in 55 basic load cases, which were considered in 200 load combinations.

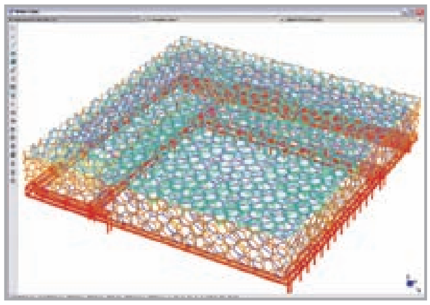
The beam loads were derived from wind and snow pressure loads which were applied to the external translucent cladding and in turn transmitted to the structural members. Using the Strand7 patch element it was a simple procedure to automatically convert these pressure loads to the relatively complex distributed beam load definitions. Strand7 offers a tool that automatically defines the load patches over a gridwork of beam elements, similar to a mesh generator. Once the patches were defined, pressure and other loads assigned to the patches were automatically transferred to the underlying beams according to their associated tributary areas.

The most significant aspect of the analysis was the seismic design. For many years Strand7 has been capable of transient dynamic and spectral seismic analyses. The latest Strand7 Release 2.3 has added the capability to take site-specific seismic time histories and simply create equivalent spectral curves. There is also the option to include the equivalent quasi-static seismic analysis as used in Eurocode EC8, AS1170.4 and other codes.

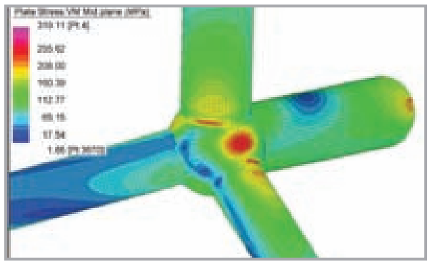
In the case of the Water Cube, a Spectral Response analysis was performed. This used the results from a natural frequency analysis that calculated 4,424 modes to achieve the 90% mass participation required for an accurate spectral response solution.

Optimisation of the structural design was required to ensure that the weight of the building could be kept to a minimum without sacrificing strength. Through the use of the Strand7 Application Programming Interface (API) the optimisation process was taken to new levels. Each of the 24,000 beam elements, subject to 200 load combinations, was checked at five points against 13 different equations in the Chinese structural code. Every member and node had the potential to be different and hence considerable optimisation processing was required. Strand7 includes a comprehensive library of material properties and standard beam sections from around the world.

The Strand7 API allows users to interact with Strand7 via an external computer program. This provides the user with the capability to bypass the Strand7 Interactive Environment or to perform specialised functions. The API provides a totally transparent way of interacting with the Strand7 data and repetitive tasks can be easily automated. The API allows new Strand7 model files (binary ST7 files) to be created from scratch, existing Strand7 model files to be modified, the Strand7 solvers to be executed and results to be extracted and processed. These powerful features were utilised in the Water Cube analysis.



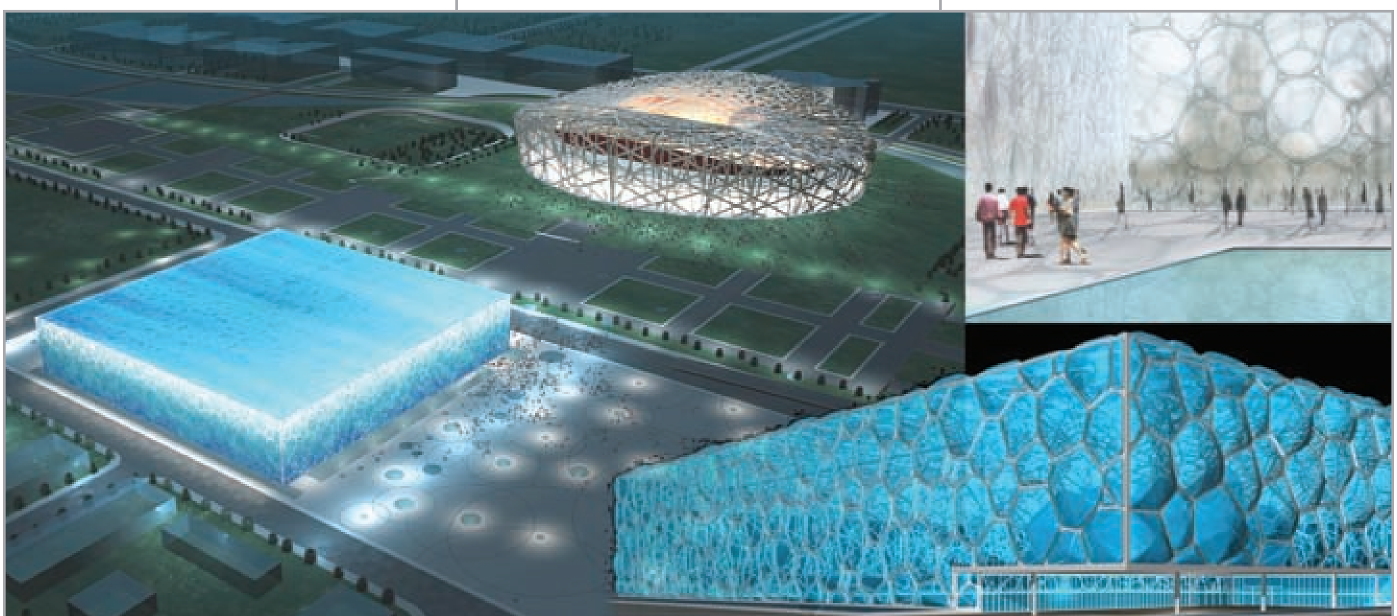
The Strand7 Finite Element model of the Water Cube.



The Strand7 Finite Element model of a local connection detail.

Using the Strand7 API, a single iteration of the entire Water Cube design optimization process took only one hour. Arup took advantage of the Strand7 Sparse Solver to facilitate this. This enhanced solver allows very large models to be solved in a much-reduced time compared with other solvers commonly found in structural analysis software. The complete optimisation process took about 25 iterations and led to a phenomenal weight saving, which brought the weight of the Water Cube down to a very light $100kg/m^2$.

Apart from the global analyses, Strand7 was also used to perform the elastic-plastic analysis of the complex beam connection details within the Water Cube. The accuracy of the results of these nonlinear analyses was confirmed by full scale testing. ***www.strand7.com***



Beijing's "Water Cube" swimming centre in the foreground with the "Birds Nest" stadium in the background - both structures analysed with Strand7.

Revit Structure

The BIM concept will always remain a pipe dream, so long as the tools are unable to handle the thousands of components that make up today's buildings. So far the focus has been on architectural elements. Autodesk has just released a product for Structures.

Martyn Day

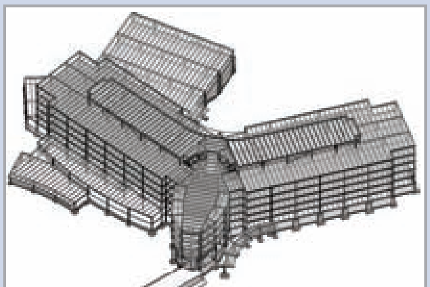
Product: Revit Structure **Supplier:** Autodesk **Price:** £POA

I feel I should start off this article by first apologising that the product I'm about to write about won't be available in Europe til next year. So, I will be teasing the structural engineers amongst us as yet again, Autodesk is developing products primarily within the USA, first for the home market and then adapting to the local conditions found in Europe and Asia/Pacific. I guess this make business sense, as the US is a very large market and while the EU may be as big, or larger, it is not homogenous. Still, I do have concerns that while the products aren't probably designed to be US centric from the outset, the fact that the first two or three revisions are fuelled by US-customer feedback can't help but lessen the flexibility when it's time for release in the EU.

So, enough grumbling. Revit is Autodesk's 'next generation' AEC design tool. Bought for the princely sum of $133 million, in 2002, the product has found it tough going against the core 2D products, on which the AEC community doggedly hold on to. The concept of Building Information Modelling (BIM), where a single 3D model provides all the 2D plans, elevations and sections, has still to catch on. There have been successes in small architectural practices and with SOM on the Freedom Tower in New York, but Revit's architectural sales means it is going to take a long time to payback its purchase fee.

Instead of drawing out everything with lines, circles and arcs, Revit uses a component-based design system, where the designer places walls, doors and windows. Previous revisions of the software have seen the complexity of components on offer mushroom, greatly enhancing the variety of architectural designs Revit can be used for. However the greater goal for BIM is to have a single model which contains components of all the building assets, structural and building services. To date Revit has only offered some dumb structural components for visual placement, while ADT has already seen a building services (HVAC) module be developed. The recent launch of Revit Structure now means that ADT can do architectural and services, while Revit can model architectural details and structural elements. This decision means neither product quite yet completes on the BIM concept of total building definition. However, Autodesk is developing a Structural package for ADT, as well as a building services package for Revit. At some point Autodesk will have two complete modelling packages, although the AutoCAD-based ADT is still more aimed at documentation-based design, than a modelling tool. Revit's parametric engine also ensures it's of greater use, earlier within the design stage, making short work of project-wide edits and updates.

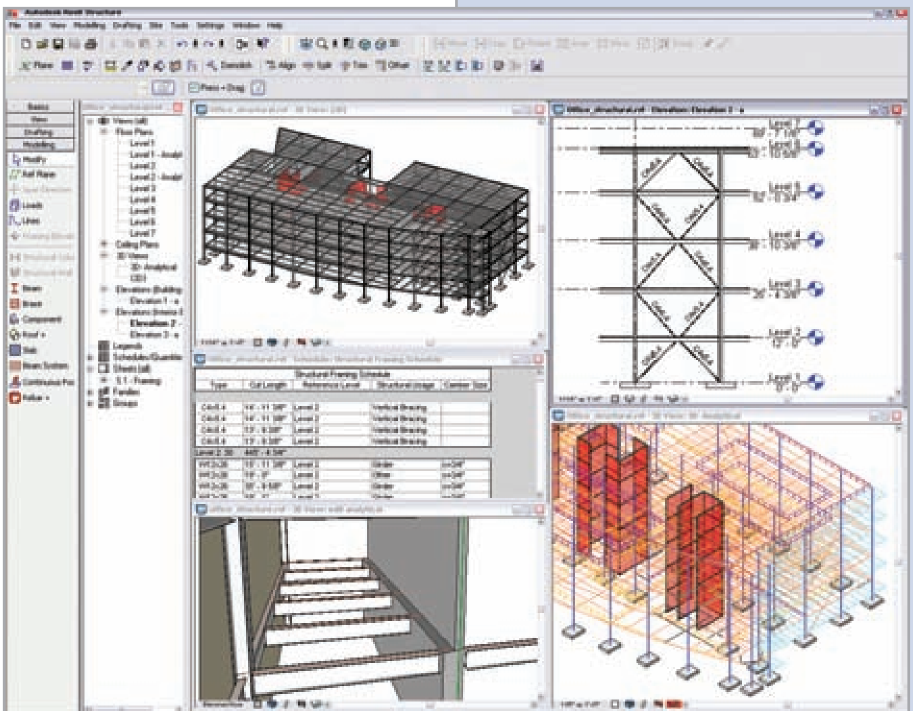
Within that the design process, structural analysis and the changes that the results can have on the overall project outcome, make Revit a great place to deploy this type of technology. Basically, Revit Structure gives structural engi- »

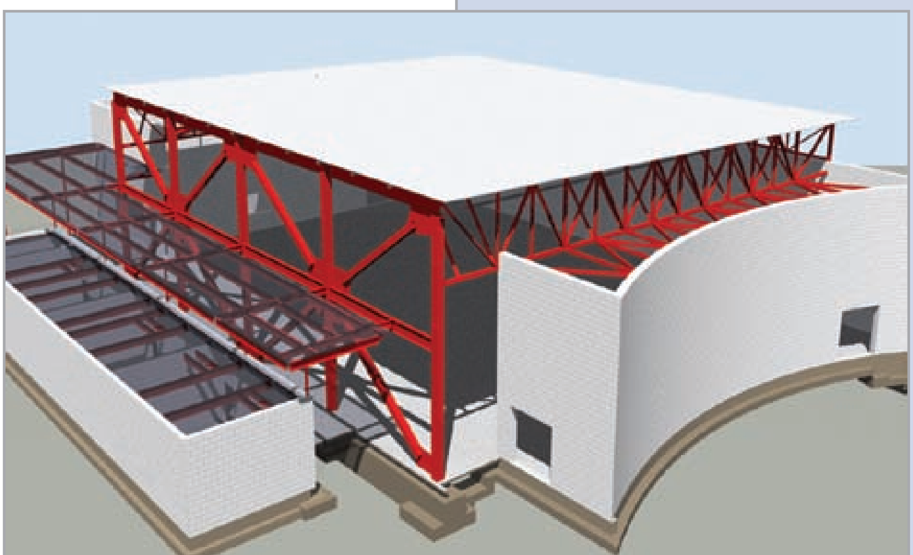


Model courtesy of Graef, Anhalt, Schloemer & Associates, Inc

An office building designed with Autodesk Revit Structure by Graef, Anhalt, Schloemer & Associates, in Milwaukee.

Autodesk Revit Structure is a building information modeling platform where a single model is used for drawing production as well as by 3rd party analysis software.





Model courtesy of Brandow & Johnston Associates

A gymnasium building designed with Autodesk Revit Structure by Brandow & Johnston Associates, Consulting Structural Engineers in Los Angeles.

neers a single environment in which all the structural members can be created in 3D and held together with the analytical model. Autodesk has developed an API (Application Programming Interface) which allows third party developers to take the Revit Structural model and analyse the data. As things stand, structural engineers may use a multitude of analysis packages, perhaps having to model the steelwork or nodal model many times. With this solution, Revit acts as the interface for multiple analysis packages, saving time and simplifying the data task. The results of the analysis can be fed back into Revit Structure and used to improve the structure, which may impact the architect's original design – and as this is all in Revit these changes will automatically feed back to the production drawings. Obviously the desire here is that the design was created in Revit Building, however Revit Structure has been designed to work just as well as a stand-alone structural interface.

Currently only available in North America, Revit Structure is linked via an API to several US-based industry applications for building analysis: RISA-3D from RISA Technologies (***www.risatech.com***), ETABS from CSI (***www.csiberkeley.com***) and ROBOT Millennium from RoboBAT (***www.robot-structures.com***). Autodesk is currently speaking with equivalent EU-based developers for the products release here next year, however Revit Structure is already in use and proving valuable on real projects.

ADT and Revit

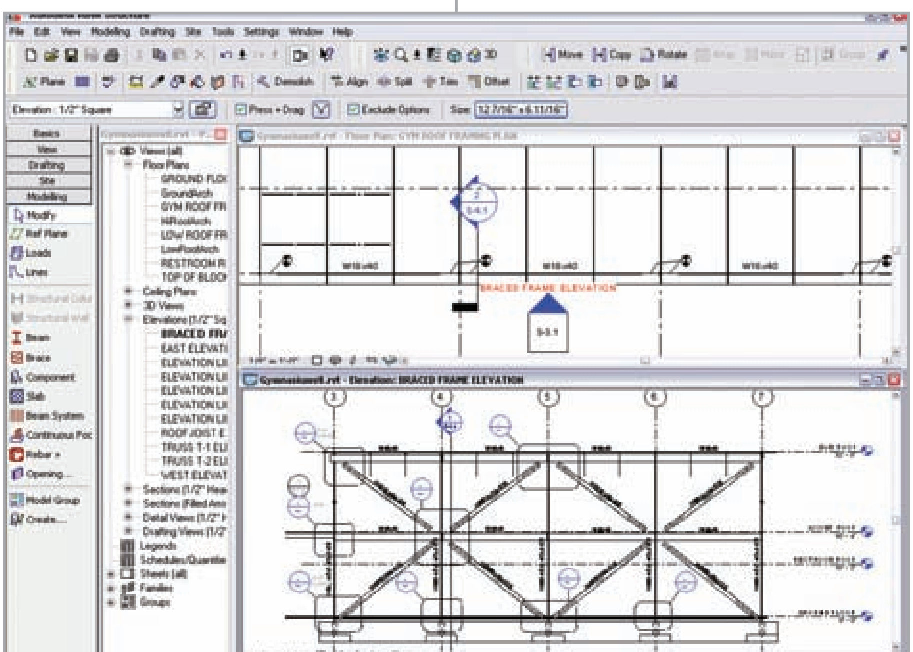
As I pointed out ADT and Revit seem to be getting different bits of the BIM jigsaw at different times. However there is an increasing degree of compatibility between the products (but perhaps not as much as some would like). It's possible for a structural firm to import an ADT model directly into Revit Structure, using the architect's model for design reference. Although I understand that many Structural engineers in the UK tend to remodel architect's drawings to iron out any errors.

Structural components in Revit Structure that are not supported in Architectural Desktop are exported to ADT as mass elements. So a complete structural model from Revit Structure can be shared directly with an architect using Architectural Desktop – enabling the architect to review the structural design inside the architectural model and check it for interferences with architectural elements, directly inside Architectural Desktop.

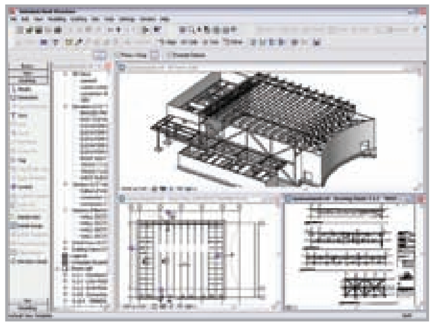
Similarly, users of Autodesk Building Systems (based on ADT), can import structural members as intelligent building objects. When exported, these can be used directly in Autodesk Building Systems, enabling HVAC engineers to layout their pipe/duct systems within the context of the structural model. Revit Structure can also import 'dumb' ACIS geometry and objects generated by Autodesk Building Systems, allowing structural engineers to view the geometry of the building environmental systems within their structural model. That said the opportunity for 'true' collaboration will be between an architect using Revit Building and a Structural Engineer using Revit Structure, enabling the parties to work on a combined model, or allowing powerful cross-linking between the parametric Revit models.

Perhaps, unusually for Autodesk, Revit Structure is more useful as a design tool, proofing the concept, as opposed to a pure documentation tool. There are more competent and complete steel detailing packages already out there. Revit Structure is looking to play a key role in structural design optimisation, while improving the level of co-ordination between architect and structural engineer.

The underlying differences between ADT and Revit, means that true model integration between the two competing systems, including geometry and intelligence, is really an unachievable goal. Autodesk has come up with a workable compromise, especially given the typical workflows, where each discipline edits its own data but the other disciplines merely need to be able to 'see' their colleagues' geometry. In time each application will get it's own building systems and structural add-ons. At that point, the BIM concept becomes more than just an interesting technology, enabling projects and design/build firms to standardise on a single 3D platform and interface.



Because any view in Autodesk Revit Structure is just a different representation of the same database, it takes no longer than a mouse click to get an automatic elevation view or section cut through the building model. Just place the elevation tag on a floor plan and the elevation view is immediately available.



In Autodesk Revit Structure, one building model drives the entire documentation set within a single electronic file.

Conclusion

I think Revit Structure is the right product at the right time in the structural market. The modelling power of Revit, combined with the parametric editing capabilities make it a great front-end for an iterative design process such as structural analysis. While in the past Autodesk has avoided developing an API for Revit, Revit Structure has necessitated this. Autodesk has settled on offering Revit as a front-end for the structural engineer, while the hard maths is done by the add-on applications, which the company is busy developing links with.

Unlike the Architectural community the payback of a Revit-based workflow is more immediately beneficial; reducing the need for multiple models and representations, offering a single easy to use environment and a tool which is capable of updating the model after analysis and quickly sharing this information back to other project members. The key benefit here for Autodesk is that the structural market is already on-board with the 3D message but have not been particularly well-served with easy to use products, particularly in the US. I think the UK has two or three key developers that have managed to cover the market and it will be Autodesk's task to bring them on board over the next year.

Whether Revit Structure will really bring on the adoption of BIM across the AEC landscape, I am really not sure. It will be good news for those few companies that are using Revit already. The nature of the fractured building process means that disciplines use their own tools for their own purposes. There's little trust in the quality of data that they are initially provided and the common denominator is 2D DWG files.

Obviously, the Revit Structure does not do everything required, it's an early release, but it will improve over the coming year before it's unleashed in Europe. Its release will be synchronised with releases of Revit Building, so the same data types will always be available in each. I am not sure how this will work with ADT's timings but Autodesk appears to have most product ready around March of each year. We will keep you informed of any news on the further development of this product.

www.autodesk.com

ADT 2006: theme of the day

Justin Taylor

In Architectural Desktop 2006, Display Themes are used to incorporate non-graphical data in a drawing by highlighting objects that meet certain specified criteria. This feature can dramatically reduce the production time for a drawing.

Ever wanted to differentiate the areas of a floor plan, based upon the room occupation? Maybe you wanted to graphically display the walls and doors based upon their fire rating, or whether they are existing or new construction. Historically, this was possible by altering the Object Display Properties; a tedious and difficult process which can lead to the corporate drawing standards being compromised, as well as eating up valuable time.

It would be far easier for users to alter the appearance of an Object via the Properties Palette, and change the Fire Rating, or Construction State etc. without altering components at Object Level, and with ADT 2006 this is now possible, plus it's simple to set up and use!

Display Themes

Display Themes are used to incorporate non-graphical data in a drawing by highlighting objects that meet certain specified criteria. These criteria can be applied to any ADT Object such as Walls, Doors and Windows, and users can utilise the PropertySet Definitions applied to those objects. The resulting theme will then analyse and graphically present your design intent by applying a colour wash to the associated components and adding a legend.

This type of highlighting is controlled through theme settings, each of which specifies a particular colour fill, hatch, or linetype. For each theme setting, there are theme rules that determine which objects will be highlighted using that setting. For example, these rules could be based upon:

PropertySet Definition	WallObject
Individual Propert	Fire Rating
Condition	Equal To
Value	1Hour
Operator	Or

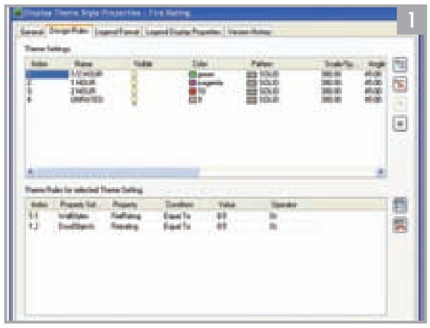
In the example shown in Figure 1, the applied Theme will search for any Objects with the PropertySet Defintition 'WallObject'. If an object is located with this definition, then the theme will look for an Individual Property 'Fire Rating' and hence apply the condition. If the individual property is equal to 1 hour, then the theme index is applied and the object will be coloured appropriately. Otherwise the operator is invoked and the routine will search for a property that matches the value.

The display theme style also specifies the format of the legend which identifies the data represented by the highlighted objects. See Figure 2.

A drawing may contain any given number of Display Themes, which can be applied or disabled at any point. In Figure 3 we see an example of a theme where the areas are assigned a colour based upon which area range they fall into. Figure 4 shows an example of how the furnishings (MVBlocks) can be displayed to show whether they are new or existing.

Conclusion

As it is possible to create a PropertySet Definition for an Object Style containing whatever information you wish, the uses for Display Themes are endless, which is what makes this one of the most powerful new features in ADT 2006. This feature can dramatically reduce the production time for a drawing, by alleviating the requirement to alter components at object level, create and control multiple layers, and even post edit drawings with additional software or manual highlighting! ***www.cadline.co.uk***



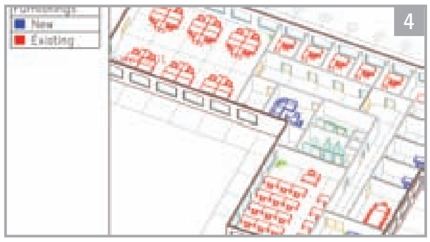
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Display Themes are controlled through theme settings, each of which specifies a colour fill, hatch, or linetype.



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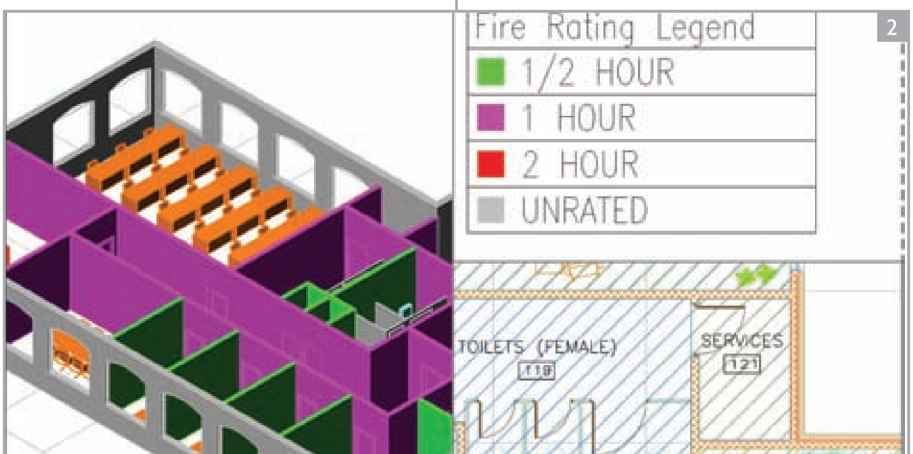
An example of a theme where the areas are assigned a colour based upon which area range they fall into.



4

An example of how the furnishings (MVBlocks) can be displayed to show whether they are new or existing.

The display theme style also specifies the format of the legend which identifies the data represented by the highlighted objects.



2

Dual core for CAD

Over the past few months we've been hearing a lot about dual core CPUs, which contain two processor cores on a single piece of silicon. Both AMD and Intel have recently launched dual core chips, but what exactly do they mean for the CAD market?

Greg Corke

There's been a steady rise in CPU clock speed over the years, but the last 12 months has seen this trend stall, with increases in GHz virtually non-existent. One of the reasons for this is the amount of heat that modern processors generate. As the size of chips get smaller and clock speeds rise, thermal management is becoming more of an issue, and while elaborate heat sinks and fans have helped combat the problem, chip manufacturers have had to look elsewhere to improve performance. Enhancements to the FSB (Front Side Bus), to increase the speed the CPU talks to the memory, and additional Level 2 cache on the CPU, to help speed access to important and frequently used data, have helped boost performance, but where are the chip manufacturers taking us next?

The answer is 'Dual Core', where two processor cores are placed on a single piece of silicon. This new technology has strong analogies to current dual processor workstations, except with Dual Core there are two CPUs within one, rather than two physical processors placed on a motherboard. With two CPUs built into one chip, workstation users are able to multitask, or carry out two tasks concurrently. For example, you can model your latest design iteration using one processor, while the other runs a rendering on an earlier design.

In addition Dual Core processors can efficiently run multithreaded applications. These are applications that can be broken down into parts - called threads - that let multiple CPUs work on them for improved performance. At present most CAD software is not multithreaded. However, there are a number of multithreaded applications in areas that require lots of computational power. These include Finite Element Analysis (FEA) or Visualisation (rendering), where additional processors can help shave minutes or even hours off lengthy calculations.

Dual Core at Intel and AMD

Both AMD and Intel have just launched dual core chips. AMD is offering dual core models of its Opteron processor, while Intel has the Pentium D and Pentium Extreme Edition, which are dual core versions of the Pentium 4 processor. However, due to the additional heat produced by having two processors on a single chip, all of these dual core processors currently run slower than top-end single core processors. For example, AMD and Intel's fastest dual core CPUs run at 2.2GHz and 3.2GHz respectively, whereas their fastest single core chips clock in at 2.6GHz and 3.8GHz.

In terms of technology and pricing AMD and Intel are currently approaching the dual core market from very different angles. AMD is positioning its dual core processors at the very high-end of the market. A dual core 2.2GHz Opteron is nearly three times more expensive than a single core 2.2GHz Opteron. As a result, you're only likely to see dual core Opteron CPUs in dual processor workstations, to form a very high-end quad processor workstation.

Intel, on the other hand, is positioning its dual core Pentium D as a cost effective dual processor solution. One 3.2GHz Intel Pentium D 840 is cheaper than two 3.2GHz Intel Xeons. However, the Pentium D does not feature Intel's Hyper-Threading technology, whereas the Xeon does. For those that aren't aware, Hyper-Threading transforms each physical CPU into two logical processors, enabling it to handle data instructions in parallel rather than one at a time. However, it doesn't do this as efficiently as two physical processors.

While Hyper-Threading isn't built-in to Intel's Pentium D, the dual core Pentium Extreme Edition (EE) does feature the technology. As the Pentium EE already has two physical CPUs, this gives you four logical processors, the same you'd get with a dual Xeon. When Intel releases a dual core Xeon processor at the beginning of next year, you'll be able to get a workstation with four physical and eight logical processors, which will completely change Intel's dual core positioning.

Dual core on test

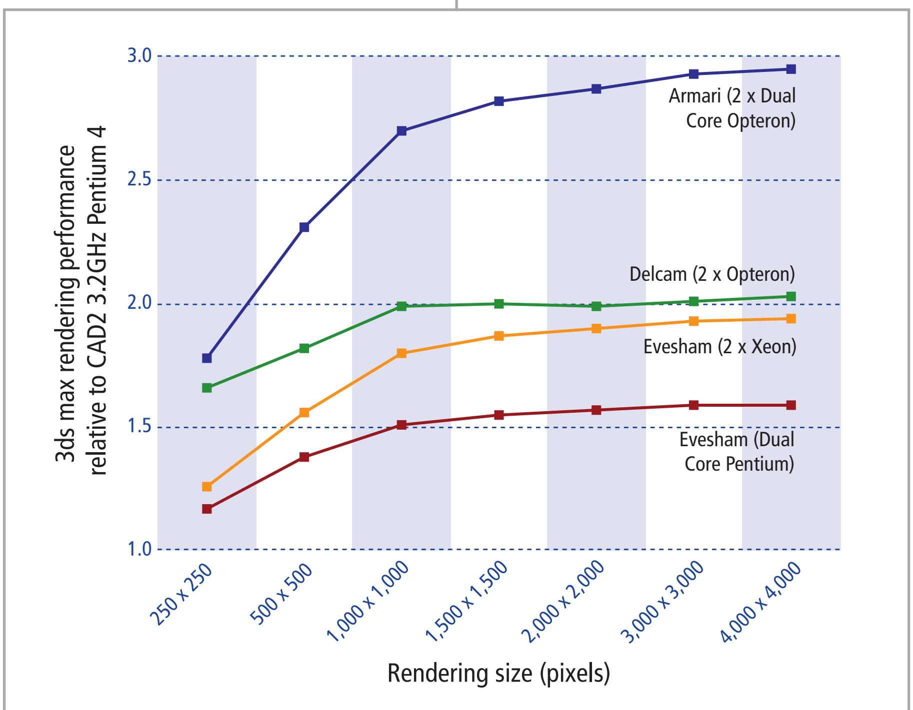
To see how good both AMD's and Intel's current dual core processors performed we tested them under the multithreaded visualisation application, 3ds max 7. Armari provided a dual AMD Opteron 275 Dual Core CPU (2x2.2GHz) workstation for the tests, while Evesham supplied a Pentium D 840 (3.2GHz) machine. Evesham also kindly lent us a dual 3.2GHz Xeon workstation so we could directly compare Intel's dual processor solution, to its dual core counterpart. For good measure, we also threw in a 3.2GHz Pentium 4 640 workstation from CAD2, and a dual AMD Opteron 252 (2.6GHz) workstation from Delcam.

We rendered a single scene in 3ds max at resolutions from 250 x 250 pixels in increments up to 4,000 x 4,000. The results were extremely interesting.

Armari's dual AMD Opteron 275 Dual Core workstation was by far the fastest machine on test. It was also interesting to see that Evesham's dual 3.2GHz Xeon workstation was 20% faster than its dual core 3.2GHz Pentium D machine. This is down to the Xeon's Hyper-Threading capabilities, which gives it four logical processors. Indeed, when we turned off Hyper-Threading in the bios the Xeon's results were virtually identical to those of the Pentium D workstation.

As an aside, it was also interesting to note that Evesham's dual 3.2GHz Xeon was nearly as fast as the dual AMD Opteron 252 (2.6GHz) workstation from Delcam. With the results so close we would also expect a dual 3.6GHz Xeon workstation to beat Delcam's machine, one of the fastest on test this month. However, it should be noted that the Xeon puts in such good figures here because 3ds max is optimised for the Intel's SSE2 instructions and is also able to take advantage of Hyper-Threading. As a result we wouldn't expect these levels of performance to translate across all multi-threaded applications.

Elsewhere we noticed that there was a lot less difference between the performance of all workstations when rendering at low resolutions, and the multi-processor



Relative performance of workstations rendering under 3ds max 7

machines only started showing their maximum performance when the renderings took several minutes (see graph above). This is because it takes a while for each individual thread to be assigned, so lower resolution renders have nearly finished before all the threads on each processor are running at full speed.

As expected we found no advantage in having two or four processors under single threaded applications. Here, Evesham's Pentium D 840 (3.2GHz) machine, produced virtually identical results to CAD 2's 3.2GHz Pentium 4 640. However, both dual core machines showed that they were able to multitask as well as their dual processor cousins when carrying out separate compute intensive tasks. However, when running four independent tests on Armari's dual AMD Opteron Dual Core workstation, the performance slowed a little.

Conclusions

A few years ago there was very little choice as to which processor you chose to put at the heart of your Windows workstation. Over the past 12 months AMD has made a big impact with Opteron, Intel has introduced countless new Pentium 4 and Xeon models, and now both Intel and AMD have launched dual core CPUs. So where does this leave the average CAD user?

At this moment in time it's fair to say all dual core processors are specialist processors. With current pricing AMD's dual core Opteron is only for high-end users, those looking for ultimate desktop performance under multi-threaded, CPU-intensive applications. Indeed, with four processors to play with dual core Opteron could give engineers the power they need on the desktop, rather than having to farm studies out to dedicated compute servers.

Conversely, Intel's current pricing of its Pentium D places it at the value end of the dual processor market, and while the Pentium Extreme Edition, with its support for Hyper-Threading, should bring dual core performance closer to that of Xeon-based workstations, top end Xeons will still have the edge due to their higher clock speeds.

Indeed, clock speed is a widespread problem for all dual core processors at the moment. In order to benefit from their multithreaded or multitasking capabilities, you have to take a performance knock under single threaded applications, of which there are still many in the CAD market. Until this changes - and we should start seeing the emergence of more multi-threaded CAD applications next year - dual core is likely to remain a valuable, but niche solution in the CAD sector.

www.intel.com / www.amd.com

Rendering performance: 3ds max 7

Manufacturer	CAD 2	Evesham	Evesham	Delcam	Armari
Processor(s)	3.2GHz Pentium 4 640	2 x 3.2GHz Xeon	3.2GHz Dual Core Pentium D 840	2 x 2.6GHz Opteron 252	2 x 2.2GHz Dual Core Opteron 275
Graphics card	PNY Quadro FX 540	ATI FireGL V5100	ATI FireGL V5100	Nvidia Quadro FX 1400	ATI FireGL V5000
Memory	2GB	2GB	2GB	4GB	4GB
Render Size	**Time taken to complete rendering (Seconds) (smaller is better)**				
250 x 250	48	38	41	29	27
500 x 500	120	77	87	66	52
1,000 x 1,000	403	224	267	203	149
1,500 x 1,500	878	469	566	438	311
2,000 x 2,000	1,545	814	985	776	539
3,000 x 3,000	3,454	1,791	2,177	1,719	1,177
4,000 x 4,000	6,126	3,154	3,847	3,018	2,079

The truth about SLI

When 3D graphics specialist Nvidia announced Quadro SLI last year it promised 'never-before-seen performance'. Twelve months down the line the majority of CAD users are still waiting says Greg Corke.

Greg Corke

A recent trend in computing is to double up the available hardware – typically if one component isn't quick enough. Intel and AMD are both at it with dual core processors, and two hard drives can be used together to maximise read/write speeds. Two are always better than one, right? Well not always.

For the past 12 months we've been waiting for Quadro SLI, the professional dual graphics card technology from Nvidia, which has been severely delayed. Using specially designed motherboards with two PCI Express x16 slots, SLI takes two high-performance Quadro FX graphics cards, and joins them together to boost performance under 3D applications. However, the reality is that not all 3D applications will benefit from SLI - and some will even run more slowly.

A background

Nvidia currently has two separate SLI technologies: GeForce SLI and Quadro SLI. GeForce SLI is designed for the consumer market to accelerate frame rates in 3D games. The technology has sold well since its launch last year and has been shown to provide impressive gains in performance under a number of 3D games. Quadro SLI, on the other hand, was developed to boost performance in professional 3D workstation applications. It was originally scheduled for launch in October 2004, but we're only starting to see these systems appear now. Indeed HP, Nvidia's official launch partner for Quadro SLI, has only just started shipping SLI in its Opteron-based xw9300 workstation. So, why has there been such a long delay with the technology, when GeForce SLI has been enthralling high-end gamers for over six months?

In short, Nvidia has experienced a lot of trouble getting SLI to work with OpenGL, the programming interface used by virtually all CAD applications to produce 3D graphics. This is a different technology to Microsoft's Direct X, which is used in the majority of games. Unfortunately the problems with OpenGL are manifold and much bigger than Nvidia first imagined, somewhat naively by its own admission.

The problems with Quadro SLI

Unlike games, which run in full screen mode, OpenGL CAD applications run in windows. These can be resized and re-positioned, and multiple viewports are common in many applications. Configuring SLI for this constantly changing environment has given Nvidia many technological issues to overcome, but the fact that the CPU limits the 3D performance in many CAD applications is giving the company even bigger headaches. Indeed, Nvidia says that many of the workstation applications, especially in the entry and mid-range CAD market are primarily CPU bound, and there's no getting around that!

Inventor, Autodesk's core solution for mechanical engineers, is a prime example of one of these applications. Over the years we've seen little difference in Inventor when using a £200 graphics card or one that costs you £2,000. Therefore, chucking more graphics horsepower at the problem, as Nvidia is doing with SLI, is not likely to make any difference to performance. In fact our tests on an SLI-enabled Opteron workstation from Delcam showed that the 3D performance in Inventor 10 went down by a whopping 30% when running in SLI mode.

> SLI is worth keeping an eye on to see how it develops, but you're definitely not guaranteed performance gains

Who will SLI benefit?

So which applications will benefit from Quadro SLI? According to Nvidia, in general, applications that are GPU (Graphics Processor Unit) bound, rather than CPU bound, will be able to scale under the dual graphics card technology. These types of applications are primarily in the high-end mechanical CAD sector and Nvidia has reported good scaling under Unigraphics and almost double the performance under MSC.Patran, a (CFD) Computational Fluid Dynamics application. Specialist VR and high-end Flight Simulation applications have also been named as beneficiaries of SLI and Delcam has reported seeing some benefits with Its 3D modelling solution, PowerShape, when working with very large models. But in the grand scheme of things this is just the tip of the iceberg. It's still early days though, says Nvidia.

It's taken Nvidia six months to fully understand how SLI can work with OpenGL and now with 80 OpenGL engineers focussed on development the company is confident that by the end of the year they'll have a pretty convincing story. But there's still a lot of work to do.

While some applications will work straight out of the box – this was exactly what happened with MSC.Patran, says Nvidia – many ISVs (Independent Software Vendors) will have to work closer with Nvidia to make Quadro SLI perform effectively with their software, possibly including some re-working of their product's code. The question is how many ISVs will have resources to spare, particularly with many already channelled into porting, or re-writing applications for Windows XP x64 Edition.

SLI, however, is not all about 'bleeding edge' performance on a single monitor. SLI Multi View can drive four high-resolution displays out of a single workstation, and the forthcoming Release 80 driver will offer a 32x SLI AA (Anti Aliasing) mode, which is designed to provide much higher image quality without compromising performance at resolutions up to 1,920 x 1,200.

Conclusion

SLI is currently a niche solution in the workstation sector. At the time of press Nvidia could only quote a handful of applications that show any significant benefit from the technology and ISVs have not yet certified their applications for SLI.

In response, Nvidia says that the dual graphics card technology is still a work in progress and expects to see improvements in performance and features with every new driver release. That said it's still likely that many applications will never benefit from SLI due to their CPU overheads, at least when it comes to speed.

Professional 3D graphics performance is a very complex issue, and the levels you can achieve are largely dependent on which application you use. Some applications will benefit from more powerful professional graphics cards, while others will be just as happy with entry-level boards. Nvidia's Quadro SLI complicates this even further by adding two high-powered graphics to the equation. If you're currently running out of 3D power and looking for new ways to boost performance, SLI is worth keeping an eye on to see how the technology develops, but you're definitely not guaranteed performance gains and the old adage of try before you buy is more important than ever.

www.nvidia.co.uk

How does SLI work?



Quadro SLI works in one of two ways: SFR or split-frame rendering splits the screen horizontally, and each card renders a portion of the screen, depending on the load. The second mode is AFR, or alternate-frame rendering, where each card renders a frame in turn.

What do you need?

- 2 x Identical Nvidia Quadro FX 1400, 3400, 3450, 4400 or 4500 graphics cards
- SLI bridging chip
- SLI-capable motherboard with two PCI Express x16 slots(e.g. Tyan Thunder K8WE or Intel D955XBK)

Windows XP x64: start of a new era?

Robert Jamieson revisits an area which is very important for the design sector, but not necessarily as important to general computing. 64-bit Windows is shipping but does it work for mainstream CAD?

Robert Jamieson

If you are a Unix user there have been many ways to get access to more RAM than is made available in Windows due to its imposed limit, but for most users who today rely on Microsoft's OS it has not been so easy. So what is the limit? I often get asked by CAD users, 'why do they need Windows XP x64 when their 32-bit Windows XP system has 3GB or 4GB of RAM?'

Under Windows XP a single process can only allocate 2GB of RAM to this one process, this being your CAD application. The CAD or Design Program can only address this amount of RAM regardless of the physical amount in your machine as it's an OS imposed software addressing limit. You can cheat and use the /3GB switch in the boot.ini file, but only certain applications can understand this and see 3GB. However, other applications can become "flaky" as this moves the allocated resources for graphics etc into other areas which these other applications might not understand. There are one or two exceptions to the rule with Microsoft email packages but that's out of our area of design.

Working with XP x64

I installed Windows XP x64 on several systems and added some 32-bit CAD software to see how it works. I'm not going to talk about relative performance issues. Instead, I'm going to look at it from a user point of view to see how viable it is to use this in a working environment today. Unfortunately today there is little CAD software that has been recompiled into 64-bit code and some of the solid modelling kernels are going to take a long time. There is (or will be soon) some 32-bit CAD software, which is 64-bit aware from the point of view from memory addressing, so this is what we are really looking at today. This gives you the ability to load larger files with a 32-bit program imposed limit of 4GB. This is double what you have today with Windows XP!

The first machine I had was a dual Fujitsu-Siemens Opteron with 6GB of RAM. Windows XP x64 Edition installed OK so I added ATI's FireGL 64-bit graphics driver and some CAD software. Once you have XP x64 up and working don't expect a massive leap from XP, it looks just the same. You will have to wait for Windows Vista – previously referred to by its internal code name Longhorn – with its new 3D interface, before you will see any changes. Now I don't favour any CAD vendor but I do have access to some software quicker than others so I put on Inventor 10 and 3dsmax 7.5. Inventor installed after I manually downloaded Netframework but the installer for 3dsmax crashed every time. If you went into the folders and manually installed each module 3dsmax did install OK.

Well there's no point in having all this memory and not putting it to good use so I created a new assembly and added in two large Mastenbroek trench diggers. This took the memory straight up to 2.25GB. It's no good patterning the model as this does not add weight i.e. use any more RAM. After adding more models I got to 3.4GB but I think this was putting a strain on the software and it was slowing down the file allocation with hard disk etc. It did not crash though!

I ran 3dsmax at the same time and the first thing it did was run on the same processor as Inventor. I could pattern large files but it became a little unstable. I wasn't very fair on max as I was running another intensive application at the same time.

After I had created a large dataset I copied it off onto a portable USB drive (it was very slow) and sent the Opteron system back where I had borrowed it from. Now it was time to have a look at a workstation in the interesting price point of £1,500, a P4 EM64T with PCI Express and 4GB of RAM from RMT. I added an extra drive so I could keep the Raid 0 with XP intact. Now this new drive had a beta of x64 so I bravely did an upgrade (I never normally recommend you do this as you end up with all the guff you had last time) and it worked fine! There were a lot more unknown devices in "device manager" so a quick trip to the manufacturers' web site and I was able to pull down and install these. The interesting thing is they were all labelled "beta drivers" but they all worked fine. Manufacturers do this when they are not sure if everything is going to work OK; it gives them a free "get out of jail" card. On went the ATI FireGL graphics 8.1.33 driver followed by Inventor and 3dsmax as before. I started to copy the CAD files off the USB drive but they were all corrupt, other files on the drive were fine so it was the USB drivers on the Opteron that were faulty. I checked the site and no updates for that system were available. Three hours down the line after I had rebuilt and re-migrated the files I tested loading up two trench diggers. The performance was similar to the Opteron but 3dsmax was more reliable.

Inventor reported in its "about" file that it could see 4GB of RAM. This is very important as when you create drawing views you need extra memory to find all the files before all the hidden line algorithms can work out what should be in the front and behind etc.

This system was the older 3.6GHz Pentium 4 EM64T motherboard (925 chipset) so it lost some allocated memory but acquitted itself fine. The newer 955 chipset RMT workstation would not lose this memory. As I type away now in Word 2003 on the x64 workstation I'm tempted to see what else works OK.

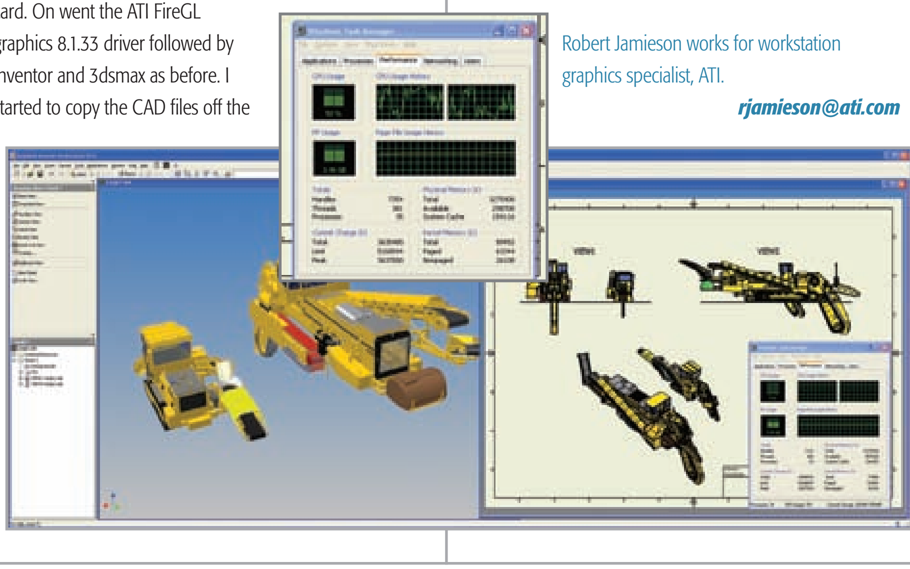
After a frustrating hour I could not get AutoCAD 2006 to install – there were problems with Demoshield 7.5 (similar to 3dsmax installer problems but you could get around it). Utility software such as Nero and DVD players were fine. Only the latest virus checkers would install, earlier ones complained.

The main conclusion that can be drawn from this exercise is that x64 is very new. You need "branded" hardware with good driver support, patience and a good understanding of how to install device drivers. Your CAD vendor will need to say that their application is supported. Inventor 10 still has a slight problem with content centre under x64 so it's still not officially supported. If you are reaching your limit in model size or it takes ages to produce drawing views because you are out of RAM and it's mission critical to get a solution, Windows XP x64 Edition is here now, just be careful!

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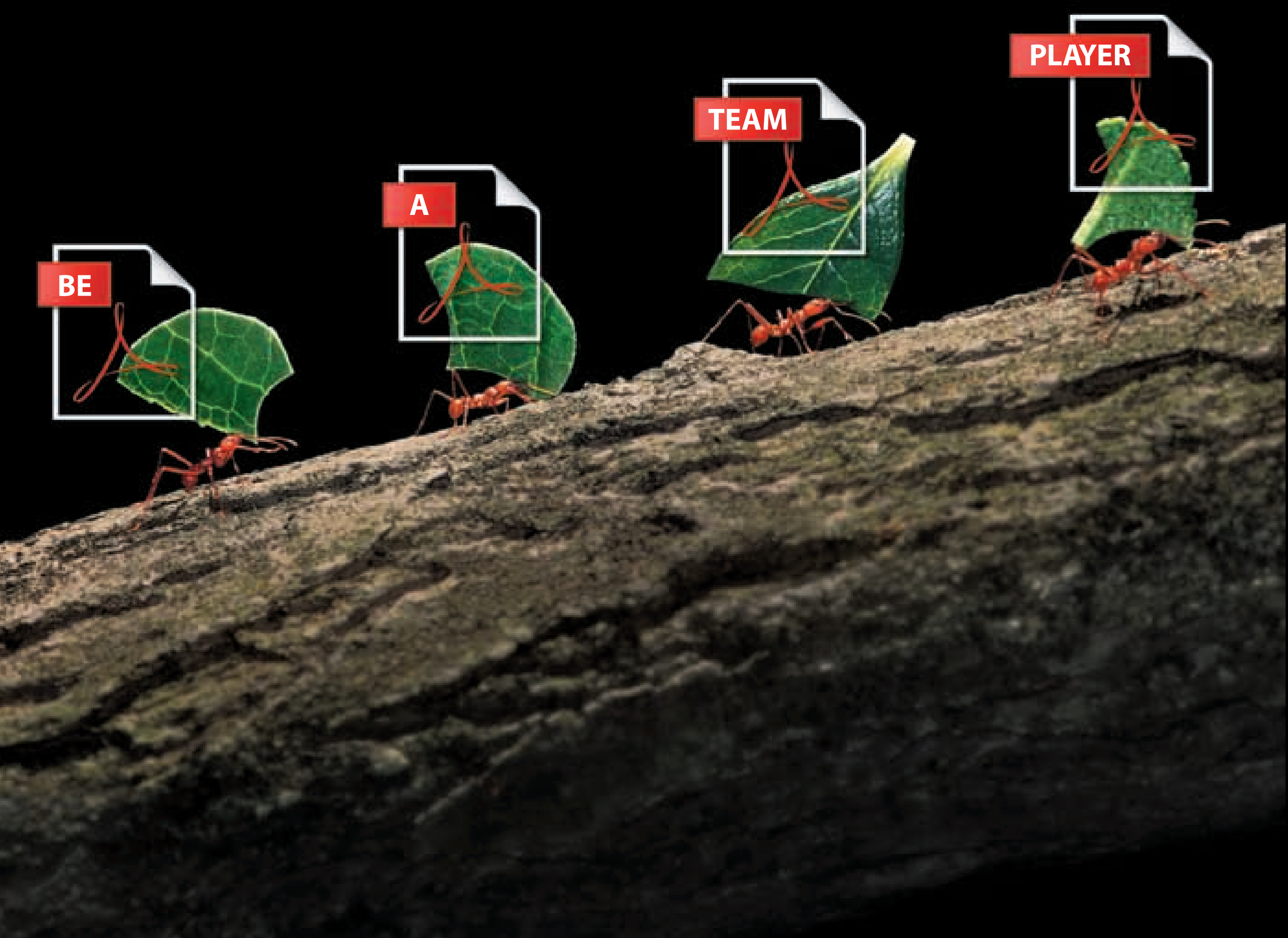
Windows XP x64 Edition trial

Trial software allows you to evaluate Windows XP Professional x64 Edition for 120 days.
www.microsoft.com/windowsxp/64bit/evaluation



The memory usage of a model changes when you do operations to it. Here we have a model views laid out in Inventor, but as soon as you edit the views the memory usage shoots up to 3.46GB. Once the edit is complete is settles back down to 2.8GB. It is more than just loading a 3D Model that uses the RAM you always need a bit extra or you will use the swap on the hard disk and slooowww down or crash!

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